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L. GARDNER AND SONS LIMITED: THE HISTORY OF A BRITISH
INDUSTRIAL FIRM. A STUDY WITH SPECIAL REFERENCE TO MARKETS,
WORKPLACE INDUSTRIAL RELATIONS, AND MANUFACTURING
ENGINEERING TECHNOLOGY, 1955 – 1986

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A thesis submitted in partial fulfillment of the requirements of The
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ABSTRACT

Investigating a range of commonly asserted characteristics relating to British family firms, this study concluded that, although they retained ownership and control and did not adopt mass-production, no persuasive evidence was found to suggest that the family managers of L. Gardner and Sons behaved unprofessionally or irrationally during the first eighty-seven years of the firm's existence.

Analysed from the perspective of markets and workplace industrial relations, it was found that the Gardner family managers coped reasonably well with most of the macroenvironmental shifts that occurred between 1955 and 1975. However, two serious errors were made: the first, which caused a short-term loss of revenue and a long-term loss of market leadership, was a result of negligence, the second stemmed from an outdated authoritarian approach to industrial relations that resulted in intense discord in the workplace, alleviated only after the management was replaced by a more astute and enlightened regime.

A third error occurred after Gardner was sold to Hawker Siddeley, a large British industrial group, in 1977. Based on a perception that Gardner's plant was outdated, the new owners invested in expensive computer controlled manufacturing systems, and increased the volume of subcontracted components, strategies that caused disruptions to production schedules, eroded quality standards, and failed to improve output. As a result, Gardner's superlative reputation for reliability and service became tarnished and its market share plummeted. In 1986, when mounting trading losses became unacceptable, the firm was sold-on to a competitor and production effectively ceased.

This thesis asserts that, as a family firm, Gardner traded profitably and provided incomes for thousands of employees for more than a century. Moreover, the sale to Hawker Siddeley conferred wealth on the family shareholders and financial security on their descendents. Gardner was not therefore, a failure either between 1898 and 1955, or before 1978.



The Last Gardner 'Family' Board of Directors, July 1977

The Chairman, Clayton Flint, is seated in the centre

On Flint's right is John Kynaston Gardner, grandson of the founder, Lawrence Gardner; on his left is Paul Gardner, Lawrence's Great Grandson

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CHAPTER 1

INTRODUCTION

What has happened to the motor industry since the 1950s exemplifies what has been going wrong in too many other parts of British industry: higher pay not matched by higher productivity; low profits, so low investment; too little going into R and D and new design ... and why haven't we had the productivity? Over manning. Resistance to change. Too many strikes and stoppages.¹

Speaking in 1981, the then Prime Minister of Great Britain's characteristically forthright observations were patently one-dimensional. Even if they were directed exclusively towards the motor industry, such sweeping assertions seem unacceptably clichéd and glib, and their wider association with 'too many other parts of British industry' render them whimsical and far-fetched. It is difficult to understand, for example, how and why so many flawed and inefficient firms could have survived during the thirty-year period that Thatcher referred to, let alone have prevailed over the harsh conditions that many would have encountered during the previous half-century, and yet have foundered seemingly *en masse* during the 1980s and 1990s. Although something clearly went wrong during the late twentieth century, to indict the majority of British industrial firms in Thatcher's depreciative terms is an oversimplified – as well as fallacious – concept. Nevertheless, her views probably reflected the sentiments of a large majority of the British population, and several of her comments certainly echo the opinions of many historians and scholars, both at the time and later. A close analysis of a typical Greater Manchester-based manufacturing engineering concern, from its foundation in 1868 until 1955, and a detailed examination of the final thirty years of its existence, reveals many inconsistencies in terms of the conventional mantra of Britain's industrial 'failure'.

I Rationale

This thesis evolved from a dissertation submitted in accordance with the requirements of the Manchester Metropolitan University for the degree of Master of Arts in 2001. Although it was not surprising that its hypothesis – which was based on the assumption that warfare and government interference impacted negatively on industrial towns in the Northwest of England during the twentieth century – was confirmed, the research exposed perceptible historiographical ambiguities that the time and volume constraints inherent in a Master's dissertation made impossible to investigate thoroughly. In particular, it revealed apparent disparities and gaps in scholarly analyses and inconsistencies in debates and assertions concerning the question of British industrial 'decline' since the mid-nineteenth century, and the so-called 'deindustrialization' of Britain during the late twentieth century. In short, the

1 Margaret Thatcher addressing the Society of Motor Manufacturers and Traders (SMMT) on 6 October 1981, quoted in Margaret Thatcher, *The Downing Street Years* (London: Harper Collins, 1993), p. 119.

historiography did not seem to correspond to the observable empirical evidence.²

Among the most worrying issues were certain wide-ranging generalizations propounded by a group of academics and historians often referred to as 'The Harvard School'. For example:

... in the new, dynamic industries of the Second Industrial Revolution - those at the centre of industrial and economic growth - there were more failures than successes in Great Britain.³

Clearly, however, this 'Chandlerian' concept of success and failure is highly subjective. Dictionary definitions broadly agree that success is the accomplishment of a desired end: the more prosaic meaning, the attainment of wealth, fame, or high-office, having, in recent times, become somewhat less acceptable, while failure is almost universally defined simply as a lack of success.⁴ Undoubtedly, however, there are cases in which the desired end is clearly implied. For example, the implied purpose of a diesel engine is to function to a specified level of performance and if it does not do so, or if it breaks down completely, it can accurately be described as having failed. Likewise, a business, by implication, desires to be profitable or at least solvent, and when it suffers financial collapse or bankruptcy it can, with complete justification, be said to have failed. It would be fallacious, however, to subjectively and superficially impose perceived desired ends on firms, such as a lack of development or inadequate rates of growth in specific areas, in order to provide evidence for alleged flaws. It would also be misleading to indict firms with failure simply because they did not pursue a course of action that historians believe they should have. Moreover, if as Chandler asserted, 'the British did not even try' in certain sectors of industry, they may well have had sound commercial reasons for not doing so, but in any case, they cannot accurately be said to have failed.⁵ To adopt an appropriate analogy, the evidence presented in this thesis will show that although, during its period as a family firm, the Gardner engine occasionally faltered, as a member of a large industrial corporation, it broke down completely and thus failed.

It is perhaps significant that the above quotation appeared in Chandler's first major monograph to encompass industrial firms outside his native USA. It was published in 1990, at the end of a decade that marked the closure of many long-established small and medium-sized British industrial firms – including L. Gardner and Sons – whose history this thesis analyses. Clearly, if the primary goal of such firms was to continue to exist, then they can accurately be considered to have failed. However, if they perceived the generation of profits to be their principal purpose, and changes beyond their control had made profitable trading

2 The dissertation can be found at, <https://cid-6a179ec8d625de09.skydrive.live.com/self.aspx/MA%20History%20Dissertation/The%20Impact%20of%20Conflict%20and%20Political%20Change.doc>

3 Alfred D. Chandler Jr., *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, Mass.: Harvard University Press, 1990), p. 274.

4 Chambers Dictionary of Etymology, s.v. "failure", "success".

5 Alfred D. Chandler Jr., 'The Enduring Logic of Industrial Success', in Barry E. Supple (ed.), *The Rise of Big Business*, (London: Edward Elgar, 1992), p. 240.

impossible, then to regard them as failures would be harsh. Moreover, as events of the first decade of the twenty-first century clearly illustrate, not even the 'modern' large-scale multinational industrial enterprises idealized by Chandlerian scholars are immune to change.

The research undertaken for the above-mentioned dissertation focused on various manufacturing engineering firms based at Bolton and Oldham between 1890 and 1990. The findings indicated that the most macroenvironmentally disruptive periods had occurred during the First World War and the Second World War when production of armaments superseded all other considerations. Between 1915 and 1918 and again between 1939 and 1945, these firms had one customer, the British Government. While some were fortunate in that their wartime production closely resembled their peacetime activities, others were obliged to make considerable changes in practically every aspect of their manufacturing methods. All, however, became completely detached from their markets, which, especially after 1918, appear to have changed considerably. It was their ability - and in some cases their willingness - to respond to such change that had the most profound effect on their long-term survival.

Some firms chose not to change, and these continued to serve their existing markets for as long as demand persisted. Others seem to have attempted to resist change, seeking refuge in cartels and government-subsidized 'rationalization' programmes and the like. The more successful firms embraced change, some more openly and enthusiastically than others, becoming, in some aspects, leaders in their chosen markets. Most of the firms involved in the so-called 'new dynamic industries of the second industrial revolution' flourished until 1914, and survived the challenging conditions of the first half of the twentieth century. After the Second World War, they thrived during the 1950s and 1960s, experienced problems during the 1970s, languished during the 1980s, and by 1990 all but two had shut down. Far from being uniquely British, these experiences reflect those of similar American firms, making Chandler's assertions regarding British 'failure' implausible, especially when the macroeconomic conditions prevailing during this period are considered.

II Focus

Based on the above preliminary findings, it is clear that further research focused on reasons for survival would reveal more than attempts to explain failure, and that a comparative study of four different manufacturing engineering concerns facing the same problems would be the most appropriate approach. Unfortunately, however, the complexities, scope and volume of such a project made it unrealizable as a doctoral thesis. Alternative analyses based on a smaller number of firms or a reduced range of criteria were also discarded on the grounds that either of these compromises would merely produce incomplete and therefore unsatisfactory conclusions. The eventual decision to undertake an analytical case study of a single firm was taken on the basis that its results may offer some innovative contrasts to currently propounded assumptions, and provide a sound basis for future comparative studies.

After careful reflection, the existence of a substantial collection of readily accessible primary source materials made L. Gardner and Sons of Patricroft, one of the four firms originally considered for inclusion in a comparative study, the most suitable subject for analysis using a case-study approach. Ostensibly a typical Greater Manchester-based manufacturing engineering concern, it was a middling-sized firm that, between 1955 and 1986, provided full-time employment for up to three thousand personnel, most of whom were highly skilled craftsmen and members of the Amalgamated Engineering Union (AEU) and its successors. A manufacturer of high-value industrial units, like many such enterprises its products were purchased by other manufacturers of capital equipment for inclusion in their own end products, making Gardner central to a network of companies that together formed a discrete industrial sub-sector. This 'cluster' of firms ultimately depended on the same markets, employed personnel with similar skills and allegiances, and was affected by very similar technological developments.

Between 1868 and 1975, in response to the many macroenvironmental shifts resulting from two major conflicts and at least one world recession, Gardner altered its management structure, and developed close relationships with suppliers, distributors, customers, and employees. In 1975, Gardner generated annual sales of almost nine million pounds and was, as it had been for most years since its foundation, a profitable concern. In January 1978, Gardner was absorbed by a major British multinational industrial Group; by 1984, the firm was languishing, and in 1986, by then a completely owned subsidiary of a direct competitor, its much reduced manufacturing plant was in the process of being closed down. This study attempts to identify the main contributing factors, both macroenvironmental and microenvironmental, which led to this situation and in doing so it is hoped that the nature of the firm as a complete organization, not merely a small elite group of managers, or a circle of trade union officials, will be revealed.

III Methodology

Using a case study approach, this thesis attempts to analyse and connect externally observable developments with internally recorded events. Formerly the preferred approach of business historians, the decline of the single firm study corresponds with the ascendancy of comparative, or institutional, methodology following the publication of Chandler's *Strategy and Structure*.⁶ Describing comparative methodology as the analysis of the techniques used by different firms to overcome the same problems, Chandler asserted that it would facilitate the creation of clearer models relating to the methods used by businessmen in the past,

6 Alfred D. Chandler Jr., *Strategy and Structure: Chapters in the History of the American Enterprise* (Cambridge, Mass.: The MIT Press, 1962); 'The publication of *Strategy and Structure* ... redirected the study of big business away from its traditional emphasis on case histories of companies and individual biographies ... and ... brought to the fore the importance of comparative history'. Maury Klein, 'Coming Full Circle: The Study of Big Business Since 1950', *Enterprise and Society*, 2 (3), 2001, p. 430; see also Barry Supple, 'Introduction: Approaches to Business History', in Barry Supple, ed., *Essays in British Business History* (Oxford: Clarendon, 1977), p. 3.

thereby making possible the formulation of 'theories and generalizations'. This, he anticipated, would establish what effect the broad regulatory and economic environment had on the development of large-scale American firms, thus leading to a better general understanding of the American economy. Comparative methodology, he predicted, would produce 'the data from which the generalizations are derived', and its findings would not, therefore, be presented as 'mere illustrations', but as contextual, firm conclusions.⁷

There can be no doubt that British historians and scholars, especially those with Harvard connections, found the new approach both original and compelling. Unfortunately, however, in their enthusiasm to embrace Chandlerian doctrine, some academics occasionally felt constrained to disparage what they described as the 'conventional' approach which, according to Chandler, resulted in 'mere case studies' and offered little scope to researchers seeking to analyse the 'deeper, underlying trends in ... history'. Particularly critical of what he regarded as 'a tradition which, at its best, is a triumph of narrative skill, honest to the facts of the individual case, but at its worst is narrow, insular, and antiquarian', Leslie Hannah urged British historians to 'study business history in a wider, internationally comparative framework with more attention to generalization and the kind of conceptual insights which Alfred Chandler has pioneered in America'.⁸

Nevertheless, even the most enthusiastic supporters of comparative methodology acknowledged the need for traditional forms of business history. As Chandler himself somewhat paradoxically stressed, 'Only after the accumulation of a multitude of case studies can generalizations and concepts which are not tied to a specific time and place be induced', a stipulation also accentuated by Hannah, Alford, and Wilson.⁹ Moreover, although Chandler warned that 'historical evidence can easily be found to support almost any set of hypotheses, propositions, or other generalizations' adding that 'To be valid [comparative studies] must compare the histories of enterprises within the same industry', other scholars have

7 Chandler, *Strategy and Structure*, pp. 1 – 7.

8 'Virtually every work now written on the history of modern, large-scale enterprise must begin by placing itself within the Chandlerian analytical framework'. Glenn Porter, *The Rise of Big Business, 1860-1920* (Arlington Heights: Harlan Davidson, 1992), p. 128; see also Richard R. John, 'Elaborations, revisions, dissents: Alfred D. Chandler, Jnr's, *The Visible Hand* after twenty years', *Business History Review*, 71 (2), 1997, pp. 151 – 201; Supple, 'Introduction', in Supple, *Essays*, p. 7; Geoffrey Jones and R. Daniel Wadhvani, 'Entrepreneurship and Business History: Renewing the Research Agenda', Working Paper, Harvard Business School, 2006, p. 1; Leslie Hannah, 'Business Development and Economic Structure in Britain Since 1880', in Leslie Hannah, ed., *Management Strategy and Business Development. An Historical and Comparative Study* (London: Macmillan, 1976), p. vii; Leslie Hannah, 'New Issues in British Business History', *Business History Review*, 57; 1983, p. 166; also John. F. Wilson, *British Business History, 1720 – 1994* (Manchester: Manchester University Press, 1995), pp. 1 – 2.

9 Alfred D. Chandler Jnr., 'Comparative business History', in: Donald C. Coleman and Peter Mathias, *Enterprise and History, Essays in honour of Charles Wilson* (Cambridge: Cambridge University Press, 1984), pp. 3 – 26; Leslie Hannah, 'Visible and Invisible Hands in Great Britain', in Alfred D. Chandler Jnr. and Herman Daems, eds., *Managerial Hierarchies, Comparative Perspectives on the Rise of the Modern Industrial Enterprise* (Cambridge, Mass: Harvard University Press, 1980), p. 52; Bernard W. E. Alford, *Britain in the World Economy Since 1880* (London: Longman, 1996), p. 267; Wilson, *British Business*, p. 1.

suggested that he did not always adhere to these conditions. 'If Chandler's work is illuminating' observed Richard B. Du Boff and Edward S. Herman, 'it is because of certain insights derived from his selective and partial view of the historical process'.¹⁰ Clearly, unless they are based on objectively and appropriately selected, historically accurate and competently composed single firm studies, comparative analyses can be highly subjective. Single firm studies are therefore an important and necessary aspect of business and economic history research because, if for no other reason, they comprise the essential foundation for comparative methodology. Without them, as an analysis of an early attempt to apply the Chandlerian paradigm to British industry illustrates, comparative business history can result in a synthesis of suppositions based largely on anecdotes and allegories.¹¹

This thesis examines, through the analysis of evidence gathered from primary sources, a range of issues and hypotheses recurrent in the historiography in economic and business history relating to family firms and the British manufacturing engineering industry. In this context, there are several positive reasons for adopting the case study approach, a technique that has been employed for many years across a variety of academic disciplines. When used to examine discrete events through empirical evidence, it is especially effective for the exploration of complex issues. A form of qualitative descriptive investigation, a case study can clarify a situation, offer possible reasons for its manifestation, and thereby reinforce, or cast doubt on, extant general theories.¹²

IV Sources

A major motivational factor leading to the research for this thesis being undertaken was the existence of a collection of documents, the main substance of which was a complete set of the minutes of meetings held by the Gardner shop stewards' committees between 1937 and 1986.¹³ A comprehensive evaluation of the nature of the evidence contained in these files revealed an almost complete absence of argument, opinion, or presupposition, thus strongly suggesting that the principal purpose in their creation had been to record, not to inform. A preliminary narrative assembled from a refined synthesis of these records confirmed that they contained sufficient data to warrant the detailed, contextual analysis that would provide the sound basis for the formation of valid, objective, scholarly deductions.

10 Chandler, *Scale and Scope*, p. 11; Richard B. Du Boff and Edward S. Herman, 'Alfred Chandler's New Business History: A Review', in Barry E. Supple, ed., *The Rise of Big Business* (Aldershot: Edward Elgar, 1992), pp. 300 – 323.

11 For example, a survey of Channon's sources reveals significant weaknesses. Out of a total of 382 sources cited, 195 are identifiable as journalistic articles in newspapers and periodicals; 23 are company produced publicity materials and publications; 49 are government and quasi-government publications; 61 are private, unpublished papers and transcripts of talks given by senior company executives; 14 are individual firm case studies, both published and unpublished; 40 are academic works on general business history, both published and unpublished. Derek F. Channon, *The Strategy and Structure of British Enterprise* (London: Macmillan, 1973).

12 Susan K. Soy, 'The case study as a research method' (unpublished paper) University of Texas at Austin, 1997.

13 National Register of Archives ref. NRA 31932 WCML MSS.

There followed an exhaustive search for other primary sources, particularly management records and statements relating to Gardner's business activities. The National Register of Archives identified just one such deposit, which comprised three Gardner documents in the form of hand-written order books dated from 1905 to 1918, held at the historical archive of Museum of Science and Industry in Manchester.¹⁴ Enquiries made at various local history archives in the Greater Manchester area had mixed and, in one instance, extremely disappointing results. Although the Manchester Archives and Local Studies section of the Manchester Central Library recorded that it held a document file relating to Gardner's financial performance, the exact nature of which was unclear, it emerged that, to the archivists' eternal discredit, this file had been 'lost'. The Salford Local History Library at Peel Park holds a fairly substantial number of Gardner related files and documents which, although very useful, could not in any way be regarded as primary sources. Other enquiries in this context made to various libraries and historical archives in the North West and in other regions of Great Britain proved unproductive.

Efforts were then made to contact ex-Gardner employees, especially former managers and directors, as well as members of the Gardner family. In this context, Paul Gardner, the great grandson of the founder, was contacted, interviewed and corresponded with. He was a director of the firm between the mid-1960s until the late 1980s, but when questioned regarding the existence of original documents he commented that at some stage he had become 'so disgusted and upset at the way [Perkins] were treating L. Gardner and Sons and its workforce that [he] got rid of most of the information that might have helped ...'¹⁵

Contact with another ex Gardner director, however, proved somewhat more productive. Dion Houghton, who was a member of the board from 1955 until the mid-1980s, had in his possession various documents, including records of engine sales and engine production between the early twentieth-century and 1976. These, he asserted, had been 'rescued' from the firm's new owners Hawker Siddeley who, because they 'were only interested in the future not the past', were apparently in the process of disposing of all pre-1978 business records held at Patricroft. Mr. Houghton confirmed that the sales and production figures included in Graham Edge's *L. Gardner and Sons Limited, Legendary Engineering Excellence* published in 2002 had been derived from the original records held by him, affirming that these were 'quite correct'.¹⁶ Thus, based on this testimony, the statistics that appear in Edge's book are regarded as a quasi-primary source.

Letters appealing for any ex Gardner employees with information regarding the period between 1955 and 1986 were given prominent positions in the Manchester Evening News,

14 National Register of Archives ref. NRA 29510 Manchester Mus. Sc.

15 Paul Gardner, Manchester to M. J. Halton, Horwich 18 March 2002.

16 Graham Edge, *L. Gardner and Sons Limited, Legendary Engineering Excellence* (Cambridge: Gingerfold, 2002), pp. 199 – 206; D. G. Houghton, Chichester to M. J. Halton, Horwich, 18 February 2004.

the Salford Journal and the Bolton Evening News. Although some responses were received, none of these produced original documents. Likewise, contacts with various websites relating to Gardner, the HCV industry and diesel engines yielded little more than secondary or anecdotal evidence.

Detailed analysis of statistical data was considered inappropriate for a qualitative study of this type. However, where the inclusion of statistics in support of hypotheses seemed necessary, data was gathered from primary or near-primary sources and cross-referenced with the figures published regularly by the Department of Trade and Industry and other government bodies. Information concerning the general economic environment is synthesized from a number of well-known expertly prepared works by eminent economic historians including Cairncross, Alford, Richardson, Floud, McCloskey, Supple, Pollard and others.

Published quantitative data on the British engineering industries is considered too vague and imprecise to have any meaningful bearing on this thesis. Qualitative data on this topic is drawn mainly from the above-mentioned sources, augmented by the hypotheses developed by Piore and Sabel, Zeitlin, Hirst, and others. Qualitative and quantitative information relating to the British commercial vehicles industry, although relatively vague for the immediate post-Second World War years, is both plentiful and detailed for most of the period covered by this thesis. Not merely statistical, the reports published annually by the Society of Motor Manufacturers and Traders in London, generally considered to be the most reliable, are used throughout.

Some use was made of scholarly works published during the 1970s. Rhys, *The Motor Industry*, and Bhaskar, *The Future of the UK Motor Industry*, both cover, to some extent, the British Heavy Commercial Vehicle (HCV) industry. They also include sections on the structure of the important motor vehicle components sector, and both mention Gardner in the context of a notable supplier of proprietary diesel engines.¹⁷ Unfortunately, neither of these works can be described as historically-based, and nor can they be regarded as completely reliable secondary sources.¹⁸

17 D. G. Rhys, *The Motor Industry: An Economic Survey* (London: Butterworth, 1972); K. Bhaskar, *The Future of the UK Motor Industry* (London: Kogan Page, 1979).

18 For example, Rhys cites no sources and his book contains no bibliographical references. It also includes clear factual inaccuracies, such as, 'The amendment to the 'Construction and Use' regulations (in 1964) allowed the use of vehicles of up to 32 tons gross vehicle weight. These larger vehicles required engines of between 170 and 225 bhp to give them sufficient power, which was a requirement that Gardner was unable to meet until 1966. This initial demand for more powerful engines plus a long drawn out strike at Gardner's in 1964, intensified the company's inability to meet all the demands of operators and vehicle builders'. (p. 92) In fact The Motor Vehicles (Construction and Use) Regulations, 1955, Statutory Instrument 1955, No. 482, Regulation No. 70, already permitted vehicles up to 32 tons. Furthermore, Gardner sold more automotive diesel engines in 1964 than it did in 1963 and, other than a brief 'go-slow' and a ban on overtime, no industrial action at all took place in 1964. See Minutes of the Shop Stewards' Committee Meeting (L. Gardner and Sons), 24 June 1964; T. F. Farrell, Patricroft, to E. Frow, Manchester, 29 June 1964; Shop Stewards' Minutes, 22 July 1964; Shop Stewards' Minutes, 19 August 1964; Likewise, Bhaskar's book

Other than these two somewhat imperfect volumes, and a factitious assortment of popular histories aimed at hobbyists and enthusiasts, historiographical works on the British HCV industry are limited to rare individual essays.¹⁹ In the former group, David Whitehead's *Gardners of Patricroft* stands out.²⁰ Commissioned for the firm's 1968 centenary, this small volume is typically sympathetic in its narrative, although not as explicitly revisionist as some. On the other hand, Graham Edge's, *L. Gardner and Sons Limited, Legendary Engineering Excellence*, is overtly so, offering an almost idealized, whimsical, and highly selective account: a legend indeed.²¹ Nevertheless, both authors had the benefit of access to at least some company records, and both books contain ostensibly credible information relating to dates, places and people. The statistical data in Edge's book, corroborated by the late Dion Houghton, an ex Gardner director who held the original documented records in his Vintage Engine Register, was also informative.

Two other secondary sources were varyingly useful in triangulating and verifying aspects of the study relating to Gardner's competitors. Although somewhat typical in that it was written for – and thus vicariously by – management, the comprehensive history of the Cummins Engine Company compiled by Jeffrey L. Cruikshank and David B. Sicilia helped to underpin many of the observations presented in this thesis.²² Similarly, the publicity material produced on behalf of the Perkins Engine Company, while factually selective and qualitatively unforthcoming, served as a limited but plausible point of reference.²³ It should also be mentioned that, while Rolls-Royce has attracted much attention in terms of its cars and its aircraft engine activities, its Shrewsbury-based diesel engine division, now part of the enigmatic Perkins group, seems to have left practically no trace of its existence.

The evidence presented in the development of the core themes of this thesis is drawn from records concerning the activities of Gardner shop stewards. The key source is a large number of minute books, housed at The Working Class Movement Library in Salford, containing summaries of regularly held meetings concerning the day-to-day issues arising in the Gardner manufacturing plant at Patricroft. Essentially a chronicle of events between 1955 and 1986, these documents contain a wealth of evidence relating to the hypotheses explored here. Whereas management-generated records, skilfully crafted and carefully

contains no bibliographical references and nor, curiously, does it include an index, and although he cites sources, these are extremely sparse.

- 19 The essays include Michael French, 'Public Policy and British Commercial Vehicles during the Export Drive Era, 1945-50', *Business History*, 40 (2), 1998. pp. 22 – 44; Howard Cooper, 'Lorries and Lorry Driving in Britain 1948 – 1968: The End of an Era', *Journal of Popular Culture*, 29, 1996, pp. 69 – 81.
- 20 David Whitehead, *Gardners of Patricroft* (Oxford: Pergamon, Newman Neame, 1968).
- 21 Graham Edge, *L. Gardner and Sons Limited, Legendary Engineering Excellence* (Cambridge: Gingerfold, 2002).
- 22 Jeffrey L. Cruikshank and David B. Sicilia, *The Engine That Could, 75 Years of Value Driven Change at Cummins Engine Company* (Boston: Harvard Business School Press, 1997).
- 23 Barry Parisson et al, *Perkins Heritage* (Peterborough: Perkins Engine Company, 2002).

worded, were usually created to inform, these handwritten and unembellished reports were intended simply to record, and they therefore represent the purest form of primary historical source.²⁴

Where clarification, confirmation, or triangulation seemed necessary, specialist and trade periodicals, national and local newspapers, and written testimonials were consulted. In this context, attempts were made to engage with ex-Gardner employees, directors, and Gardner family members. Although most of these met with guarded reticence, a limited – brief – but valuable correspondence with the above-mentioned Dion Houghton and a similarly informative sequence of letters from Carl Lingard, an ex-employee and trade union official at Gardner during most of the period covered by the three empirical chapters of this thesis, yielded clarifying information.

V Background and Structure

In general, economic historians divide the thirty-year period covered by the empirical chapters of this thesis into three distinct, but to some extent overlapping, periods.²⁵ The first, that started shortly after the end of the Second World War and ended with the first ‘oil shock’ in 1973, is usually regarded as a period of sustained growth and prosperity in the industrialised nations of the world.²⁶ The second period, which began at some stage during the late 1960s, is generally identified as an era of increasing turbulence and disorder when rising inflation resulted in slower economic growth in most advanced economies, and severe sociopolitical upheavals in others.²⁷ The third period is almost universally considered an era when, especially in post-1979 Britain, the ‘old’ ways of organising the economy were abandoned to be replaced by a new *laissez-faire system*, regulated solely by market forces.²⁸ While the three empirical chapters generally correspond to these phases, their

24 See Marc Bloch, *The Historian's Craft* (Manchester: Manchester University Press, 1954), pp. 60 – 62; Arthur Marwick, *The Nature of History, Third Edition* (Basingstoke: Macmillan, 1989), pp. 6, 199.

25 For example, ‘The twenty-six years between 1964 and 1990 fall into three contrasting periods ...’ Sir Alexander Cairncross, ‘Economic policy and performance, 1964 – 1990’, in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 67.

26 ‘The economic performance of the Western economies between 1950 and 1973 is now firmly inscribed in the annals as the period of the long boom’. Alford, *Britain in the World*, p. 245; see also Roger Lloyd-Jones and M. J. Lewis, *British Industrial Capitalism since the Industrial Revolution* (London: UCL Press, 1998), p.156; Hobsbawm, *Industry and Empire*, p. 249; Andrew Gamble, *Britain in Decline, Economic Policy, Political Strategy and the British State, Fourth Edition* (Basingstoke: Macmillan, 1994), p. 6; Sir Alexander Cairncross, *The British Economy Since 1945*, Second Edition (Oxford: Blackwell, 1995), pp. 36 – 38; Peter Howlett, ‘The Wartime Economy, 1939 - 1945’, in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 27.

27 Cairncross, *British Economy*, Second Edition, pp. 38 - 39, 183; Richard Coopey and Nicholas Woodward, ‘The British Economy in the 1970s: an Overview’, in Richard Coopey and Nicholas W. C. Woodward, eds., *Britain in the 1970s: The Troubled Economy* (London: University College London Press, 1996), p. 7; Charles Feinstein, ‘Success and Failure: British Economic Growth Since 1948’, in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 114.

28 ‘[The] government which came into power in 1979 was determined to make a complete break with the past in the management of the British economy’. Geoffrey Maynard, *The Economy*

themes reflect the specific macroenvironmental issues that, from time to time, directly or indirectly influenced the performance of L. Gardner and Sons.

In planning the structure of this thesis, a preliminary survey of primary source materials, followed by a more rigorous evaluation, revealed a distinct, chronologically segmented pattern. The first important change at Gardner occurred during the 1950s, when improvements in Britain's infrastructure necessitated adjustments in the Gardner product range, and afforded opportunities for its competitors. The second took place during the 1960s and early 1970s, when the relationship between the firm and its employees deteriorated, culminating in two prolonged and damaging strikes. The third and final watershed came about during the 1980s, not long after Gardner became a wholly-owned subsidiary of a large international engineering group. Within a few years, despite a sizeable investment in modern, high-technology manufacturing equipment and advanced computer systems, the firm was on the verge of collapse. Clearly, the most informative approach to the history of Gardner developed from a detailed examination of these three periods of important change, with particular attention to the factors that influenced their taking place.

Accordingly, the three principal chapters of this thesis present the findings of a three-pronged programme of research into the firm's history concentrating on markets between 1955 and 1960; workplace industrial relations between 1960 and 1975, and manufacturing engineering technology between 1976 and 1986. In the context of this thesis, the term 'market' covers all uncontrollable factors of the business environment, such as economic, physical, technological, political, legal, and socio-cultural, which affect performance. 'Workplace industrial relations' refers both to the internal relationship between the firm's managers and its workforce, and the wider relationship concerning trade unions and business organizations. 'Manufacturing engineering technology' is mainly concerned with developments in machine tools, production systems and automation, and with discrete changes in the technology relating to Gardner's products.

Clearly, however, Gardner did not spring Athena-like from the metaphorical forehead of *Britannia industrialis* in 1955, but evolved and metamorphosed during the first eighty-seven years of its existence, making an evaluation of its disposition *vis-à-vis* the post-war macroenvironment an essential aspect of the narrative. Thus the first, and in many ways the most important, task was to undertake research into Gardner's development between 1898 and 1955 and to compare the evidence gathered thereby with the ways such firms are represented in the historiography in economic and business history. This was especially significant in the light of the tenor of works by Chandler and his adherents, whose negative

Under Mrs. Thatcher (Oxford: Blackwell, 1988), p. iv; Thatcher's government '... claimed to be, and indeed was, very different from its Conservative predecessors'. Ian Gilmour, *Dancing With Dogma* (London: Simon and Schuster, 1992), p. 206; The new administration drew 'on the laissez-faire strain of Conservative thought [that] repudiated the consensualist Keynesianism which had dominated the economic thinking of both parties for forty years ...' Peter A. Hall, 'The State and Economic Decline', in Elbaum and Lazonick, *Decline of the British Economy*, p. 290.

views of British industrial firms are both pervasive and profuse: assertions that are explored fully in the next chapter.

CHAPTER 2

GARDNER AND THE BRITISH INDUSTRIAL FIRM IN HISTORY AND HISTORIOGRAPHY

I Introduction

History is more or less bunk. It's tradition. We don't want tradition. We want to live in the present, and the only history that is worth a tinker's damn is the history that we make today.²⁹

It is doubtful that Henry Ford appreciated the poignant inconsistency underlying his somewhat naïve and spontaneous pronouncement. Nevertheless, he was correct in his implied perception that historical literature should be viewed with at least some circumspection: a caveat that is, as this chapter expounds, particularly apt in the case of British industry. For example, in terms of the broad scope of the historiography in economic and business history, L. Gardner and Sons exemplifies the failing nature of British industrial enterprise. A manufacturing engineering business founded in Manchester in the 1860s, for most of its existence it was a middling-sized company engaged in one of the main industrial sectors of the 'second industrial revolution'. Starting as an archetypal family firm, it retained many of the characteristics perceived by some historians as indicators of family influence until its closure over a century later.³⁰ By no means a mass-producer, Gardner remained a single-site business that never provided work for more than around three thousand employees. Seldom analysed on their own merits, such firms are often portrayed as being afflicted with a range of deep-rooted, innate weaknesses that made their decline and ultimate downfall inevitable.³¹ In the face of such persuasively overwhelming evidence, it would seem that, by 1955, firms like Gardner already carried inherited and potentially ruinous flaws, inference that reinforces the significance of the following analysis.

II Gardner: Origin, Evolution and Growth, 1868 – 1955, a Concise Narrative History

Like many British engineering firms, Gardner began during the second half of the nineteenth century as a one-man, general service venture. Its founder Lawrence Gardner had moved to Manchester from Liverpool, the city of his birth, with his wife Anne, née Kynaston, in 1862,

29 Henry Ford, interview with Charles N. Wheeler, *Chicago Tribune*, May 25, 1916.

30 For a description of the 'archetypal' family firm see Roy Church, 'Family Firms and Managerial Capitalism: The Case of the International Motor Industry', in Supple, *The Rise*, p. 399.

31 On the tendency of some historians to regard family firms as inherently weak and ineffectual see Beatrice Craig, 'The Family Firm in Business History: Beyond Chandler. The Survival of Family Firms in Europe, Asia and North America in the nineteenth and twentieth Centuries', Paper, *International Economic History Conference*, Helsinki, Finland, August 2006; Alistair Owens, 'Inheritance and the Life-Cycle of Family Firms in the Early Industrial Revolution', *Business History*, 44 (1), 2002, p. 21; James Foreman-Peck, Elisa Boccaletti, and Tom Nicholas, 'Entrepreneurs and business performance in nineteenth-century France', *European Review of Economic History*, 2, 1998, p. 236.

shortly after the birth of their first child.³² A few years later, then in his late 20s, he began to offer his services as an independent mechanic, choosing, like many other engineering enterprises of all sizes, to locate his small business in Hulme, a district within easy walking distance of the city centre, close to the docks of the Bridgewater canal at Knott Mill, and adjacent to the main rail links with Liverpool, Birmingham and Leeds.³³ In this no doubt exhilarating environment, whether through diligence, good fortune or, as seems more likely, a combination of both, Lawrence Gardner's enterprise survived and flourished.

By 1888 the firm, then styled 'L. Gardner and Sons', was employing some of Gardner's several children. Edward and Lawrence junior, both trained engine fitters, and their two younger brothers, Ernest and Joseph, had all joined their father in the family business, although Thomas Harry, the eldest son, had chosen a different path. In 1875, augmenting the practical skills that he was no doubt learning from his father, he enrolled at the Manchester Mechanics' Institute and Technical School as an evening student, where he studied mathematics, physics, and chemistry. In 1881, he won a technical school exhibition, tenable at Owens College on Quay Street, resulting in a Whitworth Scholarship that allowed him to continue his education there, now full-time, for a further four years. Upon passing his final examinations at the age of 25 in 1885, he was awarded the highly regarded status of Owens Associate. He did not immediately return to the family firm, choosing instead to join the civil engineering staff of the Lancashire and North Western Railway Company.³⁴

The premature death of Lawrence Gardner in 1890 at the relatively young age of forty-nine brought Thomas Harry back into the family firm although not, at first, as a direct member of its administration. Resigning his post with the LNWR and styling himself as an independent engineer and 'Manufacturer of Special Machinery', he moved to Chorlton Road, Hulme, close to the new Gardner works on Lund Street. Over the next few years, his positive influence on the development of Gardner is evidenced by the pace of its progress. In 1892, the firm's first commercially viable electricity generating sets emerged, comprising dynamos designed by Thomas Harry, driven by gas engines made under licence to a design owned by A. E. and H. Robinson of Albert Square. By then providing work for over eighty employees, the small family firm founded twenty-two years earlier had become, by any standards, a

32 1881 Census, Public Record Office, Ref. RG11, Folio 3927/35, p. 22.

33 As clearly evidenced in *Slater's Royal National Commercial Directory of Manchester and Salford With Their Vicinities* (Manchester: Isaac Slater, 1868); also N. J. Frangopulo, ed., *Rich Inheritance, A Guide to the History of Manchester* (Wakefield: S. R. Publishers, 1969), p. 217.

34 *Slater's*, 1888; 1891 Census, <http://www.nationalarchives.gov.uk/records/census-records.htm>; Whitehead, *Gardners*, p. 10; David Allan Low, ed., *The Whitworth Book* (London: Longmans, Green and Co., 1926), p. 161; In 1904, when Owens College became part of the University of Manchester, Owens Associates were awarded the degree of Batchelor of Science, The Manchester University, Register of Graduates 1851 – 1958; The Manchester University, Development and Alumni Relations Office, Research, Legacies, Gifts and Services; also E. Fiddes, *Chapters in the History of Owens College and of Manchester University 1851 - 1914* (Manchester: Manchester University Press, 1937), p. 124.

substantial enterprise.³⁵

Soon, the increasing demand for electricity stimulated the introduction of larger dynamos and more powerful engines. Not yet true diesels, the first internal combustion engines to carry the famous Gardner marque began in 1894. These 'oil engines', which were designed by Thomas Harry and based on a concept developed by Priestman Brothers of Hull, offered a distinct market advantage in that, because they were fuelled by kerosene, they could be started instantly from cold. Following their introduction, the expansion of the Gardner product range accelerated. By 1895, then listed in *Slater's* as 'Electrical Engineers and Gas Engine Manufacturers', they were producing generating sets powered by single and multiple cylinder engines ranging from 0.5 to 25 horsepower, built in horizontal and vertical configurations.³⁶

Towards the close of the old century, a series of important strategic realignments were made in response to macroenvironmental change. First, as cheap American and German imports made the small-scale manufacture of dynamos unprofitable, Gardner diversified. Generating sets were still offered, equipped with dynamos purchased from Mather and Platt of Salford, but the range of engines was widened to include a more extensive variety of applications, built to quality standards that mass-production methods could not equal. Next, as engine production increased, general engineering and various other manufacturing activities were hived off or discontinued. Finally, responding to the wealth of opportunities in the growing prime-movers field, serious efforts were made to enter overseas markets. Choosing to start with the most prudent and least expensive exporting strategy, an established London-based firm of sales agents was appointed, selected for its well-developed and extensive worldwide network of contacts. As the new century approached, annual unit production of internal combustion engines, by then the firm's main source of revenue, reached five hundred. Nevertheless, the diversity of sizes, configurations and applications meant that Gardner remained, by necessity, a craft-based, flexible manufacturer – a system of production that ostensibly became the basis for rapid development and expansion.³⁷

The impetus of Gardner's continuing success in one of the emerging sectors of the 'second industrial revolution' brought other more significant changes, made necessary by a need to expand production and establish a sound long-term financial basis for future development.

35 At first, 'Thomas and Edward managed the business in partnership with their mother' Whitehead, *Gardners*, pp. 10 – 11; in 1926, however, he was listed in *The Whitworth Book* as 'Managing Director and Chairman' Low, *Whitworth Book*, p. 161; *Slater's* (1892); *The Iron and Steel Engineering Industries of Manchester District* (London: Iron and Steel Institute, 1935), pp. 100 – 101.

36 Sir Harry Ricardo, *Memories and Machines: The Pattern of my Life* (London: Constable, 1968), pp. 57 – 59; *Iron and Steel*, pp. 100 – 101; *Slater's* (1895); *Slater's* (1897); Whitehead, *Gardners*, pp. 11 – 12.

37 Firms' Order Books, The Museum of Science and Industry in Manchester, Archive, Ref. MS0185 (paper), Location SM22/32; Whitehead, *Gardners*, pp. 10 – 12; Edge, *Legendary Engineering*, p. 205; on export marketing strategies see Philip Kotler, *Marketing Management: Analysis, Planning and Control, Fifth Edition* (Englewood Cliffs: Prentice-Hall, 1984), pp. 450 – 452.

The first consideration was to find space to grow. Already connected to the telephone network and the telegraph, the need to remain in close physical proximity to Manchester's commercial district no longer restricted the firm to the inner suburbs. Moreover, improvements and expansions to Manchester's transportation infrastructure had opened up previously impracticable outlying districts. Thus, in February 1898, Gardner purchased 1.2 hectares of land at Patricroft, a village about eight kilometres from the city centre, adjacent to the Bridgewater canal and connected to the main railway system.³⁸ A year later, they moved into the new Barton Hall works and a year after that the firm incorporated as a limited liability company. At that time, not all members of the Gardner family became directors and nor were all the directors Gardner family members: astutely, Thomas Harry inducted Edward Norris; one of the partners of their London-based sales agents, onto the board.³⁹

During the decade leading up to the outbreak of the First World War, Gardner developed continuously and expanded rapidly. The Barton Hall manufacturing facilities were augmented by an additional 160 British, German, and American machine tools, including a significant number of automatic and semi-automatic turret lathes. (see Appendix 1) Annual engine production increased almost threefold to over two thousand units, and the number of employees grew tenfold to over a thousand. In 1912, Gardner moved from indirect to direct exporting, absorbing its London sales agent and creating a new subsidiary, Norris, Henty and Gardners, with a board of directors composed of the original partners plus Thomas Harry Gardner. By 1914, Gardner's workshops, which by then included an iron foundry, covered more than three hectares of ground, and the firm's product range included engines from five to 220 bhp, used in marine propulsion and for powering stationary equipment such as pumps, air compressors, generating sets, and other machinery.⁴⁰

There can be no doubt that the war years were extremely profitable for Gardner, as they were for many British engineering companies. Engine production fell sharply in 1914, but by October, a substantial order for gun carriage parts had been received from Vickers, and in 1915, when the factory fell under the direct control of the Ministry of Munitions, shells and other military equipment were added to the manufacturing programme. Thereafter, the capacity of the Patricroft plant was expanded by the addition of some fifty-six machine tools of various types, most of which were built by British companies such as Alfred Herbert of

38 Slater's, 1895; Slater's (1898); 'New Foundry at Winton', *Eccles and Patricroft Journal*, 4 March 1898, p. 5; John F. Wilson and John Singleton, 'The Manchester industrial district, 1750 - 1939: Clustering, networking and performance', in John F. Wilson and Andrew Popp, *Industrial Clusters and Regional Business Networks in England, 1750 - 1970* (Aldershot: Ashgate, 2003), p. 58.

39 'The authorized capital of £50,000 in £1 shares was half in six per cent preference shares and half in ordinary shares. Of the ordinary shares, 12,000 were issued to members of the Gardner family, and of the preference shares, 12,000 were sold. Lawrence, Ernest and Joseph joined Thomas and Edward on the board of directors, leaving only William to become of an age to take his share in the business'. Whitehead, *Gardners*, pp. 12 – 13, 15; Edge, *Legendary Engineering*, p. 42; also Slater's (1903).

40 Whitehead, *Gardners*, pp. 13 – 15; Edge, *Legendary Engineering*, p. 42; Ricardo, *Memories*, pp. 104 – 105; Firms' Order Books, Museum of Science and Industry.

Coventry and Churchill of Pendleton. (see Appendix 1) By 1917, engines for battle tanks were being produced in co-operation with a group of six other engine manufacturers led by Mirrlees, as well as specialized machine tools for the manufacture of engine parts. Although Gardner was fortunate in that it manufactured at least some equipment compatible with normal production, by 1918 annual engine output, at 391 units, was lower than it had been in 1899.⁴¹

The post-war years brought serious difficulties that severely tested the resilience of Gardner and its senior directors. The abrupt termination of war work was followed by a brief illusory surge in demand, after which engine sales slumped to their lowest level for over twenty years. Consequently, by 1924, the size of the workforce had shrunk to less than half the pre-1914 level. Nevertheless, Gardner's strategy remained positive. The product range was enhanced by the addition of true diesel engines, and work began on the development of lighter, high-speed units, a project that would eventually lead to the firm's entry into the fast-growing motor vehicles industry.⁴²

Although Rudolph Carl Christian Diesel's compression ignition design offered several advantages over Nikolaus August Otto's spark-ignited engine, its weight and bulk, derived from the technical necessity to operate at very high pressures, made it uneconomical for all but static and marine applications. Thus, although these drawbacks had no bearing on the diesel powered battle tanks of the First World War, for several years thereafter, commercial road transport was powered by electricity, petrol or steam. Efforts by British and German engineers to overcome these disadvantages, centred on the elimination of the need for an auxiliary air compressor, had begun early in the twentieth century.⁴³ Suspended after 1914, their renewed endeavours during the 1920s resulted in a series of breakthroughs, the most important of which was achieved by the German engineer Prosper L'Orange.⁴⁴ Thereafter,

41 Allen Skuse, *Government Intervention and Industrial Policy*, Second Edition (London: Heinemann, 1978), pp. 21, 27; also John F. Wilson, *Ferranti: A History, Building a Family Business, 1882 – 1975* (Lancaster: Carnegie, 2001), pp. 182 – 184; Firms' Order Books, Museum of Science and Industry; Ricardo, *Memories*, pp. 24, 172 - 175; Whitehead, *Gardners*, pp. 21 - 22.

42 'Eight days after the Armistice, Mr. Farrell from the Ministry of Munitions wanted to know how quickly Gardners could cut off the gun carriage work without throwing people out of work'. Whitehead, *Gardners*, p. 23; this pattern is typical for the post-war British mechanical engineering sector, see Peter Dewey, *War and Progress, Britain, 1914 – 1945* (Harlow: Addison Wesley Longman, 1997), p. 97; Ricardo, *Memories*, p. 24; Edge, *Legendary Engineering*, p. 205.

43 On the development of the high-speed diesel engine, see Otto-Peter A. Bühler, 'Die Bedeutung des Nutzfahrzeugs für die arbeitsteilige Wirtschaft' in *Mercedes-Benz in Aller Welt* (Stuttgart: Daimler-Benz, 1986), p. 56; Dieter Ritter, *Eine zündende Idee brachte den Diesel in Gang, Vor 75 Jahre Vorkammer- Diesel im Nutzfahrzeug* (Stuttgart: Daimler-Benz, 1998); Dieter Ritter, *Die "Vorkammer" ebnete den Weg zum Schnellaufenden Diesel, 1909 machte Prosper L'Orange den Dieselmotor mobil* (Stuttgart: Daimler-Chrysler, 1999); Heinz Gottwick, 'Vorgeschichte der Mercedes-Benz Nutzfahrzeugmotoren', in *50 Jahre Nutzfahrzeug- Dieselmotorenbaureihe 300 von Daimler-Benz, 1949 - 1999* (Stuttgart: Daimler-Chrysler, 1999), pp. 8 - 15; Ricardo, *Memories*, p. 233, Cruikshank and Sicilia, *Cummins*, p. 59.

44 In 1909, L'Orange, who was at that time working for Benz and Cie of Mannheim, Germany patented a design for a diesel engine 'pre-chamber' (Vorkammer). This device, which created

based on similar concepts, the pace of development accelerated.⁴⁵

By no means unaware of these events, by 1928 Gardner had developed a high-speed, lightweight diesel engine equipped with a fuel injector similar in concept to an earlier Vickers design. Designated the 4L2, this unit was first introduced to the general public at the 1929 Marine Exhibition at Olympia and was probably, therefore, intended to power marine craft. However, its potential benefits to the motor vehicle industry were recognized by the owner of a public transport company who, apparently without Gardner's prior knowledge, purchased one and successfully adapted it to drive one of his buses. In comparison with the original petrol engine, the economies of the diesel proved to be significant - so much so that, as reports of this innovation spread, other commercial vehicle operators began to make similar conversions. After around 200 engines had been adapted in the field, Gardner responded to market demand by offering a unit designed specifically for motor vehicles and, as 4L2 sales continued to increase, an aluminium foundry was added to the firm's facilities.⁴⁶

Thus, largely by proxy, Gardner entered the automotive industry, but although some exploratory attempts were made to broaden the scope of such activities, these were chiefly inconsequential and essentially fruitless. In the potentially lucrative market for diesel powered passenger cars, despite optimistic forecasts and some early success, other than a few noteworthy hybrids, virtually no headway was made.⁴⁷ Likewise, licensing agreements with firms in Belgium and France achieved remarkably little, either in terms of the number of units produced or in the level of revenue earned. Nevertheless, the advantages of a well-designed, largely proven and relatively refined product led to steadily increasing annual

a more efficient distribution of power through the ignition of a small quantity of fuel in an outer chamber connected to the cylinder head, theoretically eliminated the need for a separate compressor. Patent No. DRP 230 517, 14 March 1909; Ritter *Eine Zündende Idee*; Gottwick, *Die 'Vorkammer'*; on British developments in the area see Ricardo, *Memories*, p. 133; also L. R. C. Lilly, *Diesel Engine Reference Book* (London: Butterworth, 1984), p. 10/3.

45 MAN of Munich exhibited the first direct fuel injection diesel powered lorry in 1924. Karl Bosl, Hellmut Droscha, Horst Hausen, Hans Christoph Graf von Seherr-Thoss, Richard Daimler and Hans Seper, *Leistung und Weg, Zur Geschichte des MAN Nutzfahrzeugbaus* (Berlin: Springer, 1991); in the same year, Benz und Cie demonstrated a diesel powered lorry using the pre-chamber principle at an exhibition in Amsterdam, and in 1929, Daimler-Benz began series production of diesel-powered commercial vehicles. Bühler, 'Die Bedeutung', in, *in Aller Welt*, p. 56; also DaimlerChrysler, *50 Jahre Nutzfahrzeug*, p. 13 – 17.

46 Before 1914, Vickers developed a diesel engine for submarine propulsion incorporating a very high pressure injection system that sprayed fuel into the combustion chamber through a 'pepper caster nozzle' perforated by a large number of very small holes. Commissioned by the Royal Navy and classified 'top-secret' until the outbreak of war, these engines were built by a number of firms in the Manchester area including Crossley Brothers, Mirrlees and quite possibly Gardners. Ricardo, *Memories*, p. 133; Whitehead, *Gardners*, pp. 26 – 27; *Eccles and Patricroft Journal*, 18 July 1936, p. 12.

47 One such experiment was carried out in 1932 on a 1925 Bentley, which some have claimed as 'the first all-British diesel-engined motor-car'. Whitehead, *Gardners*, pp. 31 – 32; 'Patricroft Engine: Gardner's diesel Bentley car first at Monte Carlo', *Eccles and Patricroft Journal*, 27 January 1933, p. 5; perhaps the sharp increase in diesel fuel tax imposed by the Chamberlain government in 1935 did, as was widely predicted at the time, stifle development and initiative in this area. 'Tax Handicap, Patricroft Engineers Hard Hit', *Eccles and Patricroft Journal*, 7 June 1935, p. 5.

sales, which, by the end of 1938, had reached almost 4,000 units. Increasingly reliant on the British HCV industry, Gardner remained a single-site business linked closely to an assortment of companies that subsequently formed a specialized sector of the British manufacturing engineering industry.⁴⁸

Geographically dispersed, these firms were chiefly connected by the markets they served and by a common interest in the rules and laws governing the carrying of goods and people on Britain's roads. Like Gardner, most were long-established family firms founded in the late nineteenth century. Before the advent of the high-speed diesel, some had produced their own steam or petrol engines and, after its introduction, a few had attempted to develop diesels of their own design. Subsequently, it was the success or failure of such endeavours that divided the British HCV manufacturing sector into two distinct groups. Of these, the smallest in terms of the number of firms, but the largest in terms of their collective share of the HCV market, comprised those with diesel engine manufacturing facilities; but although they made every effort to encourage their customers to choose their own product, they were prepared to, and often did, install proprietary engines in their vehicles. Firms in the second group chose to concentrate on the design and construction of chassis, while allowing their customers to decide which make of engine was fitted, and it was these nine HCV producers that, by 1939, formed the basis of Gardner's increasingly important automotive activities.⁴⁹

Three such companies, based in the Northwest of England not far from Patricroft, became Gardner customers in the 1930s. In Preston, Atkinson Lorries began in 1907 as a small family-owned engineering firm specializing in the maintenance and repair of steam-driven heavy goods vehicles (HGVs). In Sandbach, Cheshire, E. R. Foden was established in 1887 as a builder of steam powered HGVs. Also based in Sandbach, and a relative newcomer to the HCV sector, ERF was created in the early 1930s by a group of ex-Foden directors who initially designed a range of vehicles around Gardner high-speed diesels.⁵⁰

Two other important Gardner customers were based in the midlands. Daimler Transport Vehicles of Coventry originally produced steam powered HGVs during the late nineteenth century, later adding petrol-engined buses to its range. Founded in 1913 as a manufacturer of petrol-fuelled HGVs, Guy Motors of Wolverhampton later extended its product range to

48 *Iron and Steel*, pp. 100 – 101; Edge, *Legendary Engineering*, pp. 78, 92, 205; Heavy Commercial Vehicle is a relative term, the specification of which has changed over time. In the context of this thesis, it is used to describe buses and trucks produced, because of market limitations, in volumes too low to warrant the attention of high-volume vehicle producers. See Bhaskar, *The Future*, p. 240; also Rhys, *Motor Industry*, pp. 79 – 84.

49 Rhys, *Motor Industry*, pp. 79 – 80; Edge, *Legendary Engineering*, p. 206

50 Pat Kennett, *World Trucks, Number 3: Seddon Atkinson* (Yeovil: Patrick Stephens, 1978), pp. 39, 42- 44, 57 and *passim*; Foden, *More Than a Century of Progress* (Sandbach: Foden Trucks, 1978); 'Engines At The National Boat Show', *The Engineer*, 28 January 1955, p.140; 'Engineering, Marine and Welding Exhibition', *The Engineer*, 23 September 1955, p. 433; Edge, *Legendary Engineering*, p. 206.

include buses, trolley buses, and passenger cars.⁵¹

Further south, Bristol Commercial Vehicles (BCV) started business in 1908 as a bus service operator, subsequently designing and building buses powered by petrol engines of its own manufacture. Founded in the late nineteenth century, Dennis Brothers of Guildford was originally a manufacturer of bicycles. By the early 1900s Dennis had become well-known as a producer of HGVs that were particularly suitable for heavy-duty applications and, by the 1920s, the firm was one of Britain's largest HGV builders with particular strengths in fire-fighter vehicles. Although Dennis never became a substantial Gardner customer, it was one of the first to offer Patricroft built diesels in the early 1930s and regularly purchased Gardner products for many years thereafter. Scammell Lorries began in London in the late nineteenth century as a family-owned and managed coach building and repair workshop, moving to a new purpose-built manufacturing facility at Tolpits Lane, Watford in the 1920s. Scammell's range of petrol driven HGVs, especially its articulated and rigid eight-wheeled trucks and heavy-duty six-wheeled off-highway tractors, proved especially successful, and the company became one of Gardner's most important customers.⁵²

In 1939, the British HCV sector included a number of firms that subsequently either suffered bankruptcy, involuntary closure, or remained in existence only as divisions of larger firms. Perhaps the most important of these was Albion Motors of Glasgow, founded in 1899, and Scotland's most enduring automotive firm. Crossley Brothers of Manchester, which began in the early nineteenth century as a textile machinery manufacturer, was among the world's first licenced producers of Otto's two-stroke engine, and later became one of Britain's principal internal combustion engine manufacturers. Having entered the automotive industry in 1903, by the late 1930s Crossley was the leading producer of buses in the Manchester area and one of the three largest firms in the British HCV cluster. Others, including Karrier Motors of Huddersfield, TS Motors, Maudslay Motor Company of Coventry, Shefflex of Sheffield, Vulcan of Southport, and Birmingham Carriage and Wagon of Smethwick, all disappeared, leaving little trace of their existence. While some of these firms were undoubtedly Gardner customers at some stage, none of them purchased Gardner diesels in sufficient numbers to warrant further investigation.⁵³

The Associated Equipment Company (AEC) of Southall, London, was the second largest

51 Leyland Ninetieth Anniversary Committee, *Official History 1896 - 1986* (Leyland: Leyland Vehicles, 1986), p. 42; Edge, *Legendary Engineering*, p. 206.

52 T. C. Barker and C. I. Savage, *An Economic History of Transport in Britain* (London: Hutchinson, 1974), pp. 211, 228 – 229; *Company Information* (Guildford: TransBus International, 2003); Edge, *Legendary Engineering*, pp. 89, 111, 120, 206; Pat Kennett, *World trucks, No. 8: Scammell* (Cambridge: Patrick Stephens, 1979), pp. 5, 7, 33, 50 - 51 and *passim*; Whitehead, *Gardners*, p. 206; Leyland, *Official History*, p. 26.

53 Sam McKinsty, *Sure as the Sunrise: a history of Albion Motors* (Edinburgh: John Donald, 1997); Nick Georgano et al, *Britain's Motor Industry The First Hundred Years* (Yeovil: Foulis, 1995), p. 73; S. B. Saul, 'The Motor Industry in Britain to 1914', *Business History*, 5 (1), 1962, pp. 22 – 44; Rhys, *Motor Industry*, p. 80.

HCV producer in Britain. It came into existence in 1912 when the London General Omnibus Company, an organization established in 1855 to regulate the large number of horse-drawn omnibus services then operating in the capital, hived off its bus and petrol engine production facilities at Blackhorse Lane, Walthamstow. Thereafter, the firm's continuing close relationship with the London Passenger Transport Board assured it of a virtual monopoly over the supply of buses in the London area. In 1928, AEC erected new purpose built manufacturing facilities at Windmill Lane, Southall where, by 1931, it had developed a range of high-speed diesel engines.⁵⁴

In 1939, Leyland Motors of Chorley, Lancashire, was easily Britain's largest producer of diesel-powered HCVs. Founded in 1896 as The Lancashire Steam Motor Company, a manufacturer of steam powered road vehicles and agricultural equipment, by 1914, Leyland had developed a range of petrol-fuelled buses. During the First World War, and throughout the interwar years, the firm steadily increased its manufacturing capacity and established an impressive network of agencies and subsidiaries in several British overseas territories. In 1931, Leyland introduced its own range of high-speed diesel engines, both as replacements for existing petrol engines and as standard equipment in the firm's own trucks and buses.⁵⁵

The death of Thomas Harry in 1937 at the age of 76 seems to have ushered in a sequence of misfortunes in the Gardner family that reflected the catastrophic turmoil soon to be inflicted upon the so-called advanced nations of the world. He was succeeded as chairman of the board by his 73-year-old brother Edward, the founder's second son. At the same time Thomas Harry's only son, Eric William Lawrence, was appointed Managing Director and Deputy Chairman. Less than six years later, when Edward Gardner died leaving no heirs, the chairmanship passed to Joseph, his 70-year-old younger brother. Four years later, Eric William Lawrence, aged 53, and William, the founder's youngest son, aged 57, both died unexpectedly within a few weeks of each other. Shortly thereafter, Joseph Gardner's two sons, Joseph Hugh Stott Gardner (called Hugh) and John Kynaston Gardner were made joint managing directors, while Hugh, ostensibly as the new heir apparent, was appointed deputy chairman.⁵⁶

Between 1939 and 1945, under the direction of the Ministry of Supply, Gardner's manufacturing programme, with one or two notable exceptions, comprised almost entirely diesel engines of the firm's own design. At the end of the War, Gardner employed around three thousand personnel, producing over three thousand engines a year. The product range

54 S. W. Stevens-Stratten, *Trucks in Camera: AEC* (London: Ian Allan, 1984), pp. 19, 43 and *passim*; 'Machining Engine Castings', *The Engineer*, 25 November 1955, p. 771.

55 Leyland, *Official History*, pp. 1 - 10, 22 - 26 and *passim*; Pat Kennett, *World Trucks No. 14, Leyland* (Cambridge: Patrick Stephens, 1983), p. 56.

56 Thomas Harry Gardner died in October 1937 at the age of 76. 'Eccles JP, Death of Mr. T. H. Gardner, Noted Engineer and Educationist', *Eccles and Patricroft Journal*, 29 October 1937, p. 13; 'Local Will, Mr. T. H. Gardner Leaves £159,474', *Eccles and Patricroft Journal*, 20 October 1938, p. 13; Whitehead, *Gardners*, pp. 37, 39.

at that time, although highly attuned to the HCV sector, also included engines for main and auxiliary marine propulsion, rail traction, electricity generating sets, pumping sets, and other industrial applications. Many Gardner engines were exported, mainly to British Empire and dominion countries, as components of vehicles and other capital plant, and some were shipped directly abroad from Patricroft through a network of overseas agents. Gardner employed salaried Factory Representatives stationed in Australia, Canada, Hong Kong, India, and South Africa, each of which handled a chain of localized commission agents. Established agents in Belgium, Denmark, France, and the Netherlands covered Western Europe, while in the Americas, apart from Canada, Gardner was represented only in Argentina.⁵⁷

When Joseph Gardner, the last surviving son of the founder, died in 1955 at the age of 81, the appointment of his eldest son Hugh at the age of 51 as Chairman of the Board and Joint Managing Director, with his younger brother John as Deputy Chairman and Joint Managing Director, would have surprised few. However, alterations in the structure of the rest of the Board represented something of a break with the past. Previously the preserve of family members and a few long-serving executives, four new appointments ostensibly made to strengthen the technical, marketing, and administrative complexion of the firm, introduced at least an outward aspect of professionalism.⁵⁸

The firm's first graduate engineer, Eric Todd, was born in Manchester in 1903. A close friend of the Gardner brothers, he attended the Manchester Grammar School at around the same time as Hugh. Upon leaving, he joined the engineering firm of Hans Renold (later Renold Chains) before becoming a full-time student at UMIST for three years, graduating in 1924 with BSc (Hons.) in Technology. He then returned to Renold where he worked as a design engineer until he joined Gardner in 1936.⁵⁹ William Gordon Thompstone was born in 1909 at Heaton Norris, Stockport. He attended Stockport Grammar School between 1921 and 1927, going on to study law at Manchester University from where he graduated with an LLB (Hons.) in 1930. Whether or not he ever practiced law is unclear, but at some stage, Thompstone joined the Manchester staff of the Engineering Employers' Federation (EEF). Exactly when he joined Gardner is not known, but as works director he undertook, at least outwardly, responsibility for the day-to-day administration of the Patricroft factory. The rest of the seven-man board included one other Gardner family member and two newly appointed

57 Second World War production included a small number of special engines for midget submarines. Whitehead, *Gardners*, pp. 33 – 35; Gardner product catalogue circa 1950, Salford Local History Library Archive, ref. L620 GAR (paper).

58 Whitehead, *Gardners*, p. 38.

59 They were certainly well acquainted through their mutual interest in motorcycle racing in the 1930s. 'First Link: Racing Bikes', *Eccles and Patricroft Journal*, 9 July 1975, p. 10; *Old Mancunians*; The Manchester University, Register of Graduates 1851 – 1958.

directors.⁶⁰

Frank Gardner Wilkinson, who had been a director since 1947, was the son of Elizabeth Gardner, the founder's daughter. Born in 1908, like most of the other Gardners in his age group he benefited from a privileged private education, attending the Manchester Grammar School at around the same time as John. What he did thereafter, and when he joined the family firm is not known. Although, like his two cousins, he does not seem to have gained any professional qualifications, he was nevertheless appointed to the position of company secretary in 1934 at the age of 26.⁶¹

Although Dion Gordon Houghton was not a member of the Gardner family, he seems to have vicariously inherited his position from his father, Gordon Oldfield Houghton, who had been a director of Norris Henty and Gardner since 1926. Beyond this filial association, he does not seem to have had very much connection with Patricroft, diesel engines, or the HCV industry. His appointment to the Gardner board shortly after the death of his father, with titular responsibility for sales, is therefore something of a mystery.⁶² Finally, William Eric Bradshaw's elevation to the rank of director can be safely viewed as a straightforward reward for many years service.⁶³

Thus, even as the third generation of Gardners assumed control of the business, it remained in virtually every respect a family concern, a form of governance that, according to Chandlerian philosophy, was inherently weak. Drawing on Berle and Means, Burnham, Galbraith, Sargant Florence, Cyert and March, and others, Chandler emphasized the importance of the separation of ownership from control which, he asserted, was essential to the development of progressive, large-scale corporations. For adopters of this principle, in achieving this optimum state, enterprises passed through various phases of development, reaching a vitally important stage in this process when family shareholders transferred their decision-making roles to professional managers.⁶⁴ From this perspective, as ever more companies attained this ideal administrative structure, family firms became increasingly restricted to small sectors of industry, based on traditional products. Thus in the twentieth

60 'Mr. John Gardner dies', *Eccles and Patricroft Journal*, 20 April 1974, p. 3; 'Death of Joseph Gardner', *The Engineer*, 29 July 1955, p. 170; Whitehead, *Gardners*, pp. 18, 38; Edge, *Legendary Engineering*, p. 153; *The Directory of Directors* (London: Thomas Skinner, 1954), pp. 373, 784.

61 *Old Mancunians*; *Directory of Directors*, p. 784; Whitehead, *Gardners*, p. 33, 37; Edge, *Legendary Engineering*, pp. 7, 109, 158.

62 Whitehead, *Gardners*, p. 38; Edge, *Legendary Engineering*, p. 137.

63 Old Stopfordians Association, Stockport Grammar School; The Manchester University, Register of Graduates 1851 – 1958; Whitehead, *Gardners*, pp. 18, 38; Edge, *Legendary Engineering*, p. 133.

64 Chandler, *Strategy and Structure*; Adolph Berle and Gardiner C. Means, *The Modern Corporation and Private Property* (New York: Commerce Clearing House, 1932); John Kenneth Galbraith, *The New Industrial State* (London: Penguin, 1969); James Burnham, *The Managerial Revolution* (London: Penguin, 1962); Philip Sargant Florence, *The Logic of British and American Industry* (London: Routledge and Kegan Paul, 1953); Richard M. Cyert and James G. March, *A Behavioural Theory of the Firm* (Englewood Cliffs: Prentice-Hall, 1963).

century, 'managerial capitalism' became the defining characteristic of the modern enterprise, surpassing both 'personal and entrepreneurial' forms, both of which were, allegedly, nineteenth-century systems. Moreover, according to Chandler and his followers, by the early twentieth century, while many managerial enterprises populated the industries of America and Germany, in Britain far fewer firms had completed this transition.⁶⁵

Instead, most British firms remained committed to 'personal capitalism' and 'for this reason the British story provides a counterpoint - an antithesis - to the American experience'. As successive generations inherited family firms, family managers occupied the same offices and continued to supervise day-to-day business activities, maintaining constant contact with lower management and staff. Consequently, in spite of increases in size, complexity, and specialization, 'myopic' personal management persisted well into the twentieth century and even when mergers created large-scale businesses, these remained essentially uncoordinated 'loose federations' of family enterprises.⁶⁶

Thus, family-owned and managed firms like Gardner have been indicted with a range of alleged failings, which made them generally inefficient and uncompetitive. According to some scholars, it was the proliferation and persistence of such firms that led to 'prolonged technological backwardness', making Britain 'a late industrialiser in many of the new industries of the Second Industrial Revolution' and bringing about the decline of the British economy.⁶⁷ The rest of this chapter examines the premises upon which many such assertions are based, seeking justification or otherwise for Henry Ford's somewhat puerile and artless portrayal of history.

III The Question of British Industrial Decline

'Of all the debates in British economic history', reflected Roger Lloyd-Jones and Myrddin John Lewis in their recently published study of the British machine tool industry, 'that of the

65 Alfred D. Chandler Jr. and Herman Daems, 'The Rise of Managerial Capitalism and its Impact on Investment Strategy in the Western World and Japan', in Herman Daems and Herman van der Wee, eds., *The Rise of Managerial Capitalism* (The Hague: Martinus Nijhoff, 1974), pp. 5 – 6; Chandler and Daems, *Managerial Hierarchies*, pp. 1 – 8; Alfred D. Chandler Jr. and Herman Daems, 'The United States, Seedbed of Managerial Capitalism', in Chandler and Daems, *Managerial Hierarchies*, pp. 12 – 14; Alfred D. Chandler Jr., 'The Emergence of Managerial Capitalism', *Business History Review*, 58 (4), 1984, pp. 473 – 503.

66 Chandler, *Scale and Scope*, pp. 236 – 237, 241, 252, 288 – 289, 317, 358; Donald C. Coleman and Christine Macleod, 'Attitudes to New Techniques: British Businessmen, 1800-1950', *Economic History Review*, 39 (4), 1986, p. 610; Nick Crafts, 'Reversing Relative Economic Decline? The 1980s in Historical Perspective', *Oxford Review of Economic Policy*, 7 (3), 1991, p. 92.

67 Chandler, *Scale and Scope*, pp. 4 – 5, 242; Hannah, 'Business Development', in Hannah, *Management Strategy*, p. 12; William Lazonick, 'The Cotton Industry', in Bernard Elbaum and William Lazonick, eds., *The Decline of the British Economy* (Oxford, Clarendon Press, 1986), p. 45; also Chandler and Daems, 'Rise of Managerial Capitalism', in Daems and van der Wee, *Rise of Managerial Capitalism*, pp. 1 – 7; Alfred D. Chandler Jr., 'The Development of Modern Management in the US and UK', in Hannah, *Management Strategy*, p. 49; Chandler and Daems, *Hierarchies*, pp. 1, 9 – 39.

alleged relative decline of the British economy ... is perhaps the most enduring'.⁶⁸ Clearly stated the verb 'decline' means to bend or slope downwards, as well as to refuse politely.⁶⁹ For historians, decline often connotes that something, for example the British (or Roman) empire, is approaching a terminal period in its existence, while in the historiography in economic and business history, it is usually used in the sense of a quantitative or a qualitative reduction; a deterioration in strength or degree. Apparently to indicate a slowing down or deceleration rather than a decline in absolute terms, some economic historians elect to use 'retardation' in its place, and others, ostensible for similar discretionary reasons, choose to use the term 'relative decline'.⁷⁰ As Edgerton proposed, 'By economic decline historians usually mean relative economic decline, that is to say a decline in comparison with other economies.'⁷¹ Consistent with the concept of the product life cycle, some technologies, for example the reciprocating steam engine, have declined and no longer exist, but these have invariably been replaced by other more efficient technologies.⁷² Moreover, although aspects of the British (and the US) economy have declined both relatively and absolutely, it is clear that, doomsayers past and present notwithstanding, the British nation was not and is not on the verge of economic collapse.⁷³ Thus, although some historians tacitly attempt to invoke a sense of termination, for most the clarity is either implicitly or explicitly expressed, and the meaning of 'decline' needs little further explanation.

The relevance of the question of decline in the context of this thesis lies in the vast anthology of scholarly literature it has inspired, not all of which can be described as 'declinist'. Nevertheless, there exists a broad but far from unanimous consensus among economic historians that the pace of British economic growth slowed down after 1870, although it is clear that hypotheses both regarding degree and rate of deceleration, and on the reasons for

68 Roger Lloyd-Jones and Myrddin John Lewis, *Alfred Herbert Ltd and the British machine tool industry, 1887–1983* (Aldershot: Ashgate, 2006), p. 19.

69 Chambers Dictionary of Etymology, s.v. "decline"

70 Derek H. Aldcroft and Harry W. Richardson, *The British Economy 1870 – 1939* (London: Macmillan, 1969), p. 101; Lloyd-Jones and Lewis, *Alfred Herbert*, pp. 20, 182, 204, 208; S. N. Broadberry and N. F. R. Crafts, 'British Economic Policy and Industrial Performance in the Early Post-War Period', *Business History*, 38 (4), 1996, pp. 65, 72, 86; D. C. Coleman and Christine Macleod, 'Attitudes to New Techniques: British Businessmen, 1800-1950', *Economic History Review*, 39 (4), 1986, p. 598; Roy Church, 'The family firm in industrial capitalism: international perspectives on hypotheses and history', *Business History*, 35,(4), 1993, pp 17 – 44, passim.

71 David Edgerton, *Science, technology and the British industrial 'decline', 1870 – 1970*, (Cambridge: Cambridge University Press, 1996), p. 4; see also Dilek Cetindamar Kakaomerlioglu and Bo Carlsson, (1999) 'Manufacturing In Decline? A Matter Of Definition', *Economics of Innovation and New Technology*, 8 (3), 1999, pp. 175 – 196.

72 Philip Kotler, *Marketing Management: Analysis, Planning and Control*, Fifth Edition (Englewood Cliffs: Prentice-Hall, 1984), pp. 353 – 375.

73 Prominent among these is Alfred D. Chandler Jr., *Scale and Scope: The Dynamics of Industrial Capitalism*, (Cambridge, Mass.: Harvard University Press, 1990), esp. pp. 235 – 392, passim.

its occurring, vary considerably.⁷⁴ Clearly, while the first element of this question remains a fertile area of debate, even a concise discourse on its quantitative characteristics would require, in Chandler's words, 'a second volume as extensive as this one'.⁷⁵ Moreover, the qualitative aspects of declinist theory, especially the assumptions of scholars seeking evidence to explain decline, have more enduringly shaped perceptions of firms like Gardner.

As Tomlinson observed, 'Declinism ...embraces the belief that something could and should be done to improve [British] economic performance'. Assumptions of decline, therefore, lead not just to scholarly hypotheses relating to cause, but also to exhortations for change, which, if they find approval in the right circles, can lead to well intentioned, but ultimately damaging, interventions. In this context, the old maxim 'if it isn't broken, don't fix it' pertains and is especially relevant to the 1960s and 1970s when 'the frequency of ... changes [of policies to deal with 'decline'] threatened to be part of the problem rather than part of the solution'.⁷⁶ Thus, although the periods covered by the three empirical chapters of this thesis relate to the mid- to late twentieth century, it is important to examine the substance of academic thought relating to earlier periods, and to contemplate its possible affects on the post-Second World War sociopolitical and business environment.

It should be stressed that a degree of circumspection is necessary when considering hypotheses relating to British industrial decline, especially when these relate to the second half of the twentieth century. Unfortunately, and especially following the publication of Chandler's first two major monographs in 1962 and 1977, the topic has been somewhat obfuscated by a tendency among economic and business historians to accentuate the historical pre-eminence of large-scale multinational enterprise.⁷⁷ Often disregarding the 'different economic, legal and cultural trends and traditions', much of this work has converged on critical comparisons between Britain's largest firms and their American,

74 Somewhat lyrically narrated in E. J. Hobsbawm, *Industry and Empire* (Harmondsworth: Penguin, 1968), pp. 172 – 193; analytically in Peter Mathias, *The First Industrial Nation, An Economic History of Britain, 1700 – 1914* (London: Methuen, 1969), pp. 369 – 393; prudently in Derek H. Aldcroft and Harry W. Richardson, *The British Economy 1870 – 1939* (London: Macmillan, 1969), p. 101; from a technological perspective in David Edgerton, *Science, technology and the British industrial 'decline', 1870 – 1970* (Cambridge: Cambridge University Press, 1996), pp. 1 – 13; critically in Stephen N. Broadberry, 'How Did the United States and Germany Overtake Britain? A Sectoral Analysis of Comparative Productivity Levels, 1870-1990', *Journal of Economic History*, 58 (2), 1998: 375 – 407. There are also many other sources dealing with assumptions of 'decline'.

75 Chandler, *Scale and Scope*, p. 13; for an appraisal of 'declinism' from an 'anti-declinist' perspective see David Edgerton, 'The Decline of Declinism', *Business History Review*, 71 (2), 1997, pp. 201 – 207.

76 Jim Tomlinson, 'Inventing 'decline': the falling behind of the British economy in the post-war years', *Economic History Review*, 49 (4), 1996, p. 731; also Nick Crafts, 'Forging Ahead and Falling Behind: The Rise and Relative Decline of the First Industrial Nation', *Journal of Economic Perspectives*, 12 (2) 1998: 193 – 210, p. 204; R. H. Barback, *The Firm and its Environment* (Oxford: Philip Allan, 1984), pp. 206 – 209.

77 Chandler, *Strategy and Structure*; Alfred D. Chandler Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass.: Harvard University Press, 1977).

German and Japanese counterparts.⁷⁸ Typical of this genre, for example, was Derek Channon's *The Strategy and Structure of British Enterprise*, that sought to identify perceived problems confronting British industry during the early 1970s. Comparing 'the largest 100 British manufacturing firms in 1969/70 as measured by sales volume' with 'their nearest US equivalents' based on 'a single year's performance', Channon predictably found that British industrial firms were different, claiming also that they had 'performed notably worse than their American counterparts'.⁷⁹

The importance of this work lies less in its veracity – Channon was not an historian, and his book was not intended as a work on business history – than in its autogenous affect on other comparative studies. Drawing somewhat fervently on the authority of Chandler's similarly titled work, *The Strategy and Structure of British Enterprise* formed the substance of many of Hannah's assertions in his *The Rise of the Corporate Economy*, and Chandler himself later drew heavily on both Channon and Hannah for several of his assertions regarding the shortcomings of British industrial firms. What connects these works to the topic of this thesis is that they were typical in their emphasis on the proliferation of family-controlled enterprise in British industry, and their assertions that such firms represented a threat to the health of the British economy in general and to the survival of British industry in particular. Although these assumptions appear to have originated not from contemporary studies of mid-twentieth-century British firms, but from much earlier accounts relating to the late nineteenth and early twentieth century, it is, of course, quite possible that Path Dependence, a somewhat overstated, imprecise and much debated concept, left firms like Gardner trapped in the past, predestined to repeat the mistakes of previous generations.⁸⁰

Clearly, the British economy did not actually fail at all in any rational sense but according to 'declinist' philosophy, the gradual shift away from manufacturing towards services that took place during the twentieth century represents something of a defeat. Based on this assumption, the received wisdom is that Britain needed a large manufacturing sector dominated by large-scale industrial enterprises like Krupp, General Motors and Mitsubishi, and it was the persistence of small family firms like Gardner that prevented this from

78 For an analysis of this trend see Klein; 'full circle'; examples include P. L. Payne, 'The Emergence of the Large-scale Company in Great Britain, 1870 – 1914', in Supple, *The Rise*, pp. 355 – 378; Channon, *Structure of British Enterprise*; Leslie Hannah, *The Rise of the Corporate Economy* (London: Methuen, 1976 and 1983), Hannah, *Management Strategy*, pp. 1 – 19; Chandler and Daems, *Managerial Hierarchies*; Chandler, *Scale and Scope*, pp. 235 – 392; Porter, *Big Business*; John F. Wilson and Andrew Thomson, *The Making of Modern Management, British Management in Historical Perspective* (Oxford: Oxford University Press, 2006), p. 3.

79 Channon, *Structure of British Enterprise*, p. 221.

80 Chandler, *Scale and Scope*, pp. 235 – 392, *passim*; Hannah, *Corporate Economy* (both editions), pp. 6, 61, 62, 65, 66, 67, 69, 77, 173 – 174, 181; Channon, *Structure of British Enterprise*, p. 17 and *passim*; Naomi R Lamoreaux, 'Reframing the past: Thoughts about business leadership and decision making under uncertainty', *Enterprise and Society*, 2 (4), 2001, p. 632; Lloyd-Jones and Lewis, *Alfred Herbert*, p. 19; for a general appraisal of the concept of Path Dependence see Gerard Alexander, 'Institutions, Path Dependence, and Democratic Consolidation', *Journal of Theoretical Politics* 13 (3), 2001, pp. 253 – 260.

happening. Postulations on how and why they were able to impinge on the structure of British industry are discussed more fully below, but there is much evidence in the works of declinist scholars to suggest elements of selectivity concerning the definition of family firms, which are usually vague, often merely implied, and occasionally modified to suit hypotheses.

IV The Family Firm Defined?

Roy Church's observation that, although family firms are often discussed, they are seldom defined is not wholly supported by the literature, and it is clear that several scholars, especially those whose objective is to group firms together under various headings, have attempted to construct a set of observable criteria.⁸¹ In this context, one of the most detailed definitions has been offered by Channon, who proposed that:

A company was ... termed family-controlled if a family member was the chief executive officer, if there had been at least two generations of family control, and if a minimum of five per cent of the voting stock was still held by the family or trust interests associated with it.⁸²

Occasionally he extended even this wide-ranging and loose specification to include firms that 'contained significant elements of family control' and firms in which a 'degree of father-to-son continuity' took place, either at management levels or among the workers.⁸³

The most surprising aspect of Channon's findings was that, using this definition, he was only able to categorize around a third of Britain's largest companies as family firms. Even so, in order to substantiate his hypothesis, he appears to have found it necessary to introduce a degree of selective re-categorization based on a palpably syllogistic approach. For example, while there was no doubt that Guinness 'was family-owned and controlled at board level', it was also a progressive enterprise that achieved significant commercial success, leading Channon to assert that 'there was apparently little family intervention in management' at Guinness.⁸⁴

81 Church, 'Family Firms and Managerial Capitalism', in Supple, *The Rise*, p. 398; also Roy Church, 'The family firm in industrial capitalism: international perspectives on hypotheses and history', *Business History*, 35 (4), 1993, pp 17 – 44; some recent definitions include, for example, 'Enterprises were classified as "family-owned" if individuals related by blood or marriage ties controlled over 50 per cent of the capital'. Robin Mackie, 'Family Ownership and Business Survival: Kirkcaldy, 1870–1970', *Business History*, 43 (3), 2001, pp. 1–32; '... a family firm is defined as a business in which more than 50 per cent of the shares are owned by a single family that is involved in the management of the business and where there is an intention of transferring the business from one generation of this family to another'. Emmanuel Ogbonna and Lloyd C. Harris, 'The adoption and use of information technology: a longitudinal study of a mature family firm', *New Technology, Work and Employment*, 20 (1), 2005, p. 3; 'By a family business we mean one that is partly owned by one or more family members who together control at least twenty per cent of the total votes outstanding'. Danny Miller and Isabelle Le Breton-Miller, 'Family Governance and Firm Performance: Agency, Stewardship, and Capabilities', *Family Business Review*, 19 (1), 2006; There are many more.

82 Channon, *Structure of British Enterprise*, p. 16.

83 Ibid., pp. 15 – 16, 75 – 76, 150.

84 '[Guinness'] rate of return remained substantially higher than that of any other brewing company ...' Channon, *Structure of British Enterprise*, pp. 96 – 97; 'the Guinness family soon had a staff of full-time salaried managers'. Chandler, *Scale and Scope*, p. 267.

Andrea Colli, who has written much on the subject, proposed that a 'realistic definition' of a family firm is one in which 'the family' is able, through its shareholdings, to impose its preferences in the appointment of individual senior executives and to affect business strategies.⁸⁵ Similarly, Chandler and Daems proposed that companies remained within the family firm category (either 'personal' or 'entrepreneurial' enterprises) as long as 'an entrepreneur, or family, or a few individuals' could control them through majority shareholdings.⁸⁶ One of the broadest definitions, even more wide-ranging than Channon's, was Chandler's later proposal that firms remained 'personal' or 'entrepreneurial' until 'the executives in the administrative hierarchy have no connection with the founders or their families and have little or no equity in the company'.⁸⁷ Curiously, whereas three of these definitions called for a degree of consanguinity, part of the Chandler and Daems model required only a modicum of collusion. Unfortunately, none of them attempted to define the term 'family' which, as any dictionary shows, has culturally-based ambiguities and can be interpreted in various ways.

It is interesting to speculate on the probable outcome of the studies of British firms carried out by Channon and – respectively – Chandler, if these very different definitions could be applied to each in turn. For example, if Channon had used the Chandler and Daems model, significantly fewer large-scale British firms would have been classified as family-controlled, while Chandler's *Scale and Scope* model would have encompassed most of them. Further speculation regarding possible motives for the re-categorization of firms is also tempting. For example, *Scale and Scope* was published in 1990, a time when the manufacturing industries of Britain and America were rapidly contracting.⁸⁸ Among the large-scale firms in serious difficulties on both sides of the Atlantic were some that Channon had identified as McKinsey-reformed, managerially restructured, 'modern' enterprises, leading Philip Scranton to evocatively observe; 'From the vantage point of the 1990s one cannot celebrate [American] corporate giants' optimization of factor efficiencies as uncritically as was possible a generation ago, now that even managerial jobs are haemorrhaging amid a sea of debts and restructuring'.⁸⁹ A cynical observer may well reflect that, while the Chandler and Daems

85 Andrea Colli, *The History of Family Business, 1850 – 2000* (Cambridge: Cambridge University Press, 2003), p. 74.

86 Chandler and Daems, *Managerial Capitalism*, p. 6.

87 Chandler, *Scale and Scope*, p. 241.

88 On American industrial 'decline' see Michael L. Dertouzos, Richard K. Lester, and Robert M. Solow, *Made in America: Regaining the Productive Edge* (Cambridge, Mass: The Massachusetts Institute of Technology, 1989); Robert Forrant, 'Too Many Bends in the River: The Decline of the Connecticut River Valley Machine Tool Industry 1950 – 2002', *Journal of Industrial History*, 5 (2), 2002, p. 71; 'the entire U.S. machine tool industry experienced a debilitating decline during the 1980s' <http://ech.case.edu/ech-cgi/article.pl?id=MT>; also Kotler, *Marketing Management*, pp. 1 – 2.

89 Philip Scranton, *Endless Novelty, Speciality Production and American Industrialization, 1865 – 1925* (Princeton: Princeton University Press, 1997), p. 7; Channon, *Structure of British Enterprise*, pp. 103, 110, 115, 122, 132, 134, 136, 137, 141, 143, 144, 145, 155, 166, 168, 170, 172, 179, 183, 187, 192.

definition, as well as Channon's, would have classified most of these firms as 'managerial', Chandler's later specification places nearly all of them well within the family firm category.

Although it would be harsh to surmise that Chandler modified his definitions in order to portray failing firms as family firms, in a major work on American industry published in the same year as *Scale and Scope*, Neil Fligstein, questioning several of Chandler's deductions and assumptions, implied a certain level of selectivity.⁹⁰ Similarly, but more forcefully, Hannah pointedly criticized what he believed was Chandler's partiality, alleging that while many American and German firms administered by boards of directors 'stuffed full of family members' had been classified as managerial enterprises, British firms with much less family participation had been categorized as family-controlled and managed. Furthermore, and somewhat sarcastically, Hannah accused Chandler of regarding some British companies as family firms simply because their chief executives, who were also minority shareholders, were 'suspected of having a mother and a father'.⁹¹

Thus, the issue of clearly defining the 'family firm' in economic and business history literature, and in several other academic disciplines, continues to challenge. In the meantime, meaning different things to different people, it will continue to permit researchers to infer negative or positive characteristics, confirm or refute a range of preconceived hypotheses, and produce problematic conclusions. Moreover, the uncertainties inherent in translating generic expressions across economic and cultural boundaries make international comparisons based on 'family firms' largely ineffective. As a term, therefore, 'family firm' is surely too general and imprecise to be useful for economic and business history research.⁹²

V Perceived Measures of Inadequacy

Such ambiguities notwithstanding, the cumulative nature of the general discussion was summarized by Aldcroft and Richardson as 'Once retardation is established ... the problem is such that one can carry on adding cause upon cause until one has a very long, impressive, but meaningless list'. Moreover, their caveat that 'There are so many arguments possible that its comprehensiveness is scarcely profitable' has not discouraged those who accept the assumption of decline from adding to an increasingly copious body of 'declinist' work, and nor has it deterred other, less convinced, scholars from expounding their

90 Neil Fligstein, *The Transformation of Corporate Control* (Cambridge Mass.: Harvard University Press, 1990), pp. vii, 57, 73, 133, 154, 323; also William Lazonick, 'Organizational Capabilities in American Industry: The Rise and Decline of Managerial Capitalism', in Supple, *The Rise*, especially pp. 258 – 259.

91 Leslie Hannah, 'Ownership and Control in the Twentieth Century: Ambiguous Trends in Marriage and Divorce, Beyond Chandler: The Survival of Family Firms in Europe, Asia and North America in the 19th and 20th Centuries', Paper, International Economic History Conference, Helsinki, Finland, 2006.

92 Pramodita Sharma, James J. Chrisman, Jess H. Chua, 'Strategic Management of the Family Business: Past Research and Future Challenges', *Family Business Review*, 10 (1), 1997, pp. 1 - 35; Andrea Colli, Paloma Fernandez Perez, and Mary B. Rose, 'National Determinants of Family Firm Development? Family Firms in Britain, Spain, and Italy in the Nineteenth and Twentieth Centuries', *Enterprise and Society*, 4, 2003, pp. 28–64.

confutations.⁹³ Appearing regularly in such narratives, propositions that British family firms were amateurish, riven by classism and snobbery, repressed by conservative and short-term strategies, and enfeebled through nepotism, are appraised below.

Amateurism

Following a simple schema, in the historiography in economic and business history the amateurism allegory develops from hypotheses relating to British industrial decline. Applied to companies of all types and sizes over an extensive timescale, its fundamental argument is that, with the possible exception of a brief period in the late twentieth century, at no time did the British education system adequately serve the needs of industry. Revealing scant awareness of the concept of Newtonian dwarves and giants, still less of the genius of bootstrap technology, the customary narratives centre on the notion that, during the early stages of the industrial revolution, most British inventors and designers were self-taught enthusiasts whose unsophisticated discoveries were the result of pure chance or random experimentation. This situation was acceptable for as long as industrial products remained 'basic' and 'traditional', but with the advent of the 'science-based industries' of the 'second industrial revolution', innovation increasingly depended on the application of scientific and technological expertise. In Germany, and to a somewhat lesser extent in the USA, this was provided by universities, both through their direct links with industry and as sources of highly qualified 'professionals'. In Britain, especially in England, no such institutional ties existed until the early twentieth century, and even then the concept of vocationally centred higher education was disapproved of by most academics. Moreover, according to some historians, although the number of 'professionally qualified' graduates increased thereafter, because the majority of British managers were not themselves university educated, they failed to appreciate the value of university degrees.⁹⁴

93 Derek H. Aldcroft and Harry W. Richardson, *The British Economy 1870 – 1939* (London: Macmillan, 1969), p. 101; 'declinist' works include Martin Wiener, *English Culture and the Decline of the Industrial Spirit, 1850 - 1980* (Cambridge: Cambridge University Press, 1981); Correlli Barnett, *English Culture and the Decline of the Industrial Spirit, 1850 - 1980* (London: Macmillan, 1986); Correlli Barnett, *The Collapse of British Power* (London: Macmillan, 1972); Correlli Barnett, *The Lost Victory* (1995); Scott Newton and Dilwyn Porter, *Modernization Frustrated: The Politics of Industrial Decline in Britain Since 1900* (London: Methuen, 1988); also Tom Nicholas, 'Clogs to Clogs in Three Generations? Explaining Entrepreneurial Performance in Britain Since 1850', *Journal of Economic History*, 59 (3), 1999, pp. 688 – 713; Wilson and Thomson, *The Making of Modern*.

94 Hobsbawm, *Industry and Empire*, pp. 172 – 174; Mathias, *First Industrial*, p. 388 – 389; Aldcroft and Richardson, *British Economy*, pp. 147 – 151; Channon, *Structure of British Enterprise*, pp. 44 – 45; Hannah, *Corporate Economy*, Second Edition, p. 88; Nick Crafts, 'The Assessment: British Economic Growth Over the Long Run', *Oxford Review of Economic Policy*, 4 (1), 1988, p. ii; T. R. Gourvish, 'British Business and the Transition to a Corporate Economy: Entrepreneurship and Management Structures', in Supple, *The Rise*, p. 343; Maurice W. Kirby, 'The corporate economy in Britain Its rise and achievements since 1900', in Maurice W. Kirby and Mary B. Rose, eds., *Business Enterprise in Modern Britain from the Eighteenth to the Twentieth Century* (London: Routledge, 1994), p. 139 – 171; Mary B. Rose, 'Investment in human capital and British manufacturing industry to 1990', in Kirby and Rose, *Business Enterprise*, pp. 339 – 371; Geoffrey Jones, 'Global perspectives and British paradoxes', *Business History Review*, 71 (2), 1997, p. 291; Alford, *Britain in the World*

Few contemporary writers appear to have been concerned that deficiencies in the nineteenth-century British education system were adversely affecting industry. Indeed, a perfunctory examination of the works of Samuel Smiles reveals a tacitly favourable opinion of Britain's universities and various other educational institutions in addition to, of course, the value of 'self help'.⁹⁵ Even Alfred Marshall, one of the first academic writers to introduce the concept of a German 'zeal for solid education', made many positive comments regarding Britain's universities, particularly the 'new Universities [that] have sprung up in several great centres, modelled in some respects on that at Manchester'. Although he praised the German education system 'as a preparation for the work of modern business', observing that 'Germany [held] a leading place in scientific studies' which was 'the foundation of industrial progress' making Germany 'without a rival in the organized application of science to practical problems', his approval was by no means unqualified. Expressing 'reasons for doubting whether the average student at a German University is as well taught, or takes his studies as seriously as the average student at English Universities', Marshall divulged other, more ominous misgivings. Prominent among these was his opinion that, while 'A chief strength of German education lies in its order and system. Discipline is indeed a foe to spontaneity; while spontaneity is the chief creator of original work, and especially of that which makes epochs in thought'. Such discipline, moreover, was 'a good preparation for subordinate work in factory' but achieved 'only a partial success in the education of self-reliance; of the ability to forbear as well as to bear; and of quick intuitive sympathy': strongly portentous reflections in view of the sociopolitical catastrophe that was even then fermenting.⁹⁶

Marshall's observations were made as part of his assessment of Germany's improved performance in steel production and chemicals. However, later and more generalized analyses, ostensibly expanding on his evaluation, accentuated what they believed to be Britain's increasingly unprofessional approach to industry once the first benefits of industrialization were spent. According to Mathias, for example, by the end of the nineteenth century, '...the brilliant amateur, the practical man with no systematic education in science or technology ... was becoming a liability'.⁹⁷ Such broad assumptions, unsupported by empirical evidence, are common in declinist narratives in which idiomatic expressions like 'practical tinkerers' and 'rule-of-thumb' methods proliferate.⁹⁸ Discussions regarding the

Economy Since 1880 (Harlow: Longman, 1996), p. 267; Wilson and Thomson, *The Making of Modern*, pp. 157 – 161; Lloyd-Jones and Lewis, *Alfred Herbert*, pp. 198 – 199.

95 Samuel Smiles, *Men of Invention and Industry* (London: Murray, 1884); Samuel Smiles, *Industrial Biography: iron makers and tool makers* (London: Murray, 1863), Samuel Smiles, *Lives of the Engineers (various volumes)* (London: Murray, 1874).

96 Alfred Marshall, *Industry and Trade, A Study of industrial technique and business organization and of their influences on the condition of various classes and nations, Third Edition* (London: Macmillan, 1920), pp. 71 – 72, 89 – 90, 356.

97 Mathias, *First Industrial*, p. 388.

98 Aldcroft and Richardson, *British Economy*, p. 148; Coleman and Macleod, 'Attitudes', p. 603; S. B. Saul, 'The American Impact on British Industry 1895-1914', *Business History*, 3 (1), 1960, p. 24; Wayne Lewchuk, *American Technology and the British Vehicle Industry*

British education system are also replete with similarly hyperbolized propositions. Whereas Germany's numerous universities and colleges 'provided an army of technicians and scientists for the new science-intensive industries', Britain's mechanics' institutes 'trained only the "non-commissioned officers"... the literate artisan anxious to improve himself into the foreman or master-fitter status'.⁹⁹

Thus, the assumed decline of British industry has often been explained by an alleged failure of the British education system during the late nineteenth and early twentieth centuries. Thereafter, although the number of universities in Britain increased, as did the volume of undergraduates studying science and technology, these developments did not, according to the declinist view, restore Britain's competitive edge. Seeking other causative associations, many scholars apparently discovered correlations between family firms and amateurism. For example, although Hannah later recanted his anti-familial stance, in his earlier work he claimed that in the 1930s 'public company boards retained strong controlling family elements, excluding professional[s] in favour of amateurs'.¹⁰⁰ His justification for this bland assertion is discussed more fully below, but he was by no means alone in this view. Gourvish also referred to the 'cosy amateurishness' of 'conservative family management' that endured in firms of all sizes between the wars 'whether ... management was dominated by owners, or salaried managers, or neither'.¹⁰¹ For Wilson and Thomson, a 'highly amateurish approach to business' endured until the post-Second World War era, manifesting in firms in which vestiges of family influence persisted, regardless of structure, size, or ownership.¹⁰²

Chandler's comprehensive critique of British industry, especially the quality of its leaders, encompassed all these negative aspects and more besides. Bound up with notions of snobbery and class distinction, which are discussed below, he claimed that in Britain only 'the sons of the founding fathers' received a university education. In Chandler's opinion, Oxford and Cambridge were both 'nursery[ies] for gentlemen, statesmen and administrators' where the pursuit of knowledge was of little importance; attitudes which, he proposed, were diffused to 'the new "red brick" civic universities' in the twentieth century. In a thinly disguised manipulation of evidence, a stratagem often adopted by Chandler, he compared the number of 'engineering students graduating from the universities of England and Wales', with 'three or four of the leading American engineering schools' and 'engineers graduating from German

(Cambridge: Cambridge University Press, 1987), p. 121; Roger Lloyd-Jones and Myrddin J. Lewis, 'Personal capitalism and British industrial decline: The personally managed firm and business strategy in Sheffield, 1880-1920', *Business History Review*, 68 (3), 1994, pp. 364 – 412; Wilson and Thomson, *The Making of Modern*, p. 202.

99 Aldcroft and Richardson, *British Economy*, p. 148 - 149; also Wilson and Thomson, *The Making of Modern*, p. 160; Mathias, *First Industrial*, p. 389.

100 Hannah, *Corporate Economy*, Second Edition, p. 88.

101 Gourvish, 'Transition', in Supple, *The Rise*, p. 343.

102 Wilson and Thomson, *The Making of Modern*, pp. 41 – 42;

universities and institutes'. The fallaciousness of this 'comparison' lies in its exclusion of Scottish universities and other British technical colleges on the one hand, and the inclusion of American 'engineering schools' and German 'institutes' on the other. Moreover, his observations regarding 'the years when business schools in the United States and the Handelshochschulen (literally "commercial colleges") in Germany were growing rapidly [and] Oxford and Cambridge taught no business subjects', which specified no dates and excluded British commercial colleges, is also misleading. Nevertheless, according to Chandler, with very few exceptions, British providers of higher education offered 'no graduate work in ... commerce or business' until 'long after World War II'. Typically, he did not clarify just how long, but he was quite clear that before then 'Production managers or engineers, as they were termed, and accountants' were 'trained on the job'. Their only means of achieving managerial status was through 'serving as apprentices in production or as articled clerks in accounting and finance' and subsequent entry into 'professional societies [which had been established] well before the turn of the century'.¹⁰³

Thus, perceptions of 'amateurism' with their implicit and explicit associations with 'family firms' are extended from the late nineteenth century and the self-taught 'mechanics' to the impractical intellectuals produced by Oxbridge and the 'Redbrick' establishments of the early to mid-twentieth century and beyond. However, while there appears to be little disagreement with the general concept that British industry's perceived ills could have been cured by the generous application of university graduates, it is not clear what their primary role would have been. For Marshall, it was obvious that Britain needed more scientists, especially applied scientists employed in specific aspects of industrial development and production, while Chandler saw the function of 'colleges, universities, and institutes' as 'generating scientific information and in graduating trained managers'. In his opinion, scientific learning was not among the range of shortcomings that made British firms fail in emerging sectors of the 'second industrial revolution'. 'British inventors such as Joseph Swan and Sebastian Z. Ferranti were as technologically able as Edison, Westinghouse, and Thomson in the United States and Werner Siemens and his associates in Germany', and British 'workers were as skilled as those in Germany and the United States'. British firms 'failed' because they 'did not believe that extensive investment in manufacturing, marketing, or management was necessary' and for this reason they 'remained of little significance in the development of the British electrical machinery industry'.¹⁰⁴

In similar context, it may be worth considering some of the influential people in the development of the internal combustion engine, one of the key 'dynamic new industries' that emerged in the late nineteenth century. Although the Frenchman Philippe Lebon is usually afforded the title 'father of the gas engine', it is generally recognized that the first practical unit was designed in 1820 by the Englishman William Cecil, a clergyman and a Fellow of

103 Chandler, *Scale and Scope*, pp. 292 – 293.

104 Ibid., p. 276.

Magdalene College, Cambridge. In 1860, the self-taught Belgian chemist Jean Joseph Etienne Lenoir built what many regard as the first gas-powered car, and in 1876, the German, Nikolaus August Otto, who was a high-school dropout, a shop assistant, and a travelling salesman, patented the precursor of the modern petrol engine. Henry Ford, whose name is synonymous with the passenger car industry, left school at 15, worked on his father's farm, and subsequently served as an apprentice in a machine shop.¹⁰⁵ Little suggestion here of the systematic application of science to industry and, apart from Cecil's attachment to the Cambridge Philosophical Society, even less of the university educated 'professional'.

Like many other implied definitions to be found in the historiography in economic and business history, 'amateurism' is rarely, if ever, clearly explained. Used by some historians to describe someone who is not professionally qualified, it is usually meant as a pejorative term to imply incompetence. In some cases, there are hints of unwarranted and largely outmoded disdain for vocational qualifications gained via systems such as apprenticeships rather than through higher education. In the engineering industries, master fitters and artisans, whether literate or not, were at least as necessary to a firm's success as were designers. Hospitals need skilled nurses as well as highly qualified surgeons, but to imply that the former are amateurs is clearly fallacious, as it illogically fails to recognize that they are two complementary branches of the same profession. While Edgerton's work has cast some doubt on the general perceptions of the inferiority of the British education system in relation to that of Germany, Mary B. Rose has proposed that British enterprise failed 'to value human resources during the nineteenth and early twentieth centuries'.¹⁰⁶ However, while there has clearly been a prolonged and continuing disregard for the importance of the quality of human capital, it would be a distortion to attach much, if any, of this negligence to the existence of family firms, however defined.

Classism and Snobbery

Difficult to prove but easy to allege, classism and snobbery are among the least satisfactory explanations put forward to support assumptions of British industrial decline. In the absence of formally instituted social rankings, their existence can only be inferred from behaviour, the one being cited as an indicator of the other, and the evidence offered for their existence is therefore largely based upon anecdote and opinion. By nature impressionistic, perceptions of classism and snobbery, while seeming real enough to those who believe that they exist, can be neither proven nor refuted. Closely connected to amateurism, they are derogatory, bilateral, value-loaded terms that from the perspective of the early twenty-first century need to be treated with caution.

For example, Alfred Marshall's work abounds with references to the social strata of

105 Paul Simsa, 'Vom Motor zum Auto', in *in Aller Welt*, pp. 6 – 9.

106 Rose, 'Investment in human capital', in Kirby and Rose, *Business Enterprise*, p. 339.

nineteenth-century Britain, such as labouring class, working class, trading class, middle class, employing class, governing class, etc. However, while his use of such expressions may appear to demonstrate the existence of class distinction, consideration must be given to more modern classifications such as JICNAR ratings and the like. Marshall was an economist, not a sociologist, and it therefore seems reasonable to infer that his terminology was based on income groups rather than elites.¹⁰⁷

Superficially more accusatory, Donald C. Coleman's much cited 'Gentleman and Players' explored the perspective that class distinction negatively influenced the nature of British entrepreneurial skills. In essence, the essay offered one possible explanation for the perceived decline of industrial Britain in the late nineteenth century, when 'the business and technological drive of the English industrial revolution [had lost] some of its momentum'. Its core assumption was that 'The social structure of pre-industrial revolution England had only one really important division: between those who were Gentlemen and those who were Players'. Educated at public schools and at Oxford and Cambridge, the 'Gentlemen' comprised an exclusive socio-political group which, as the industrial revolution unfolded, the newly enriched 'Players', 'practical men' who had been 'trained' but not 'educated', wished to join.¹⁰⁸

According to Coleman, in striving for recognition and social status, the 'Players' diminished their own and their descendants' ability to function as entrepreneurs. While the first generation used their affluence to acquire country estates in order to become accepted as part of the 'landed gentry', the second or third generation were sent to public school and Oxbridge, institutes that were 'in many respects ... club[s] for young men of the nobility and gentry, or at least of wealth'. Here they received a 'Gentleman's' education, which emphasized 'classical learning' and chivalrous grooming in preparation for a life of idleness and leisure. In such establishments, industry or 'the making of things' was associated with 'manual labour and thus to be comprehended within the proper tasks not of the gentleman'. Instead, the descendants of wealthy industrialists were instructed in the esoteric and abstract facets of the arts and the classics; anything in fact that could not be regarded as 'functional training directly aimed at a specific vocation'. Thus, according to Coleman, Britain's industrial dynamism may have weakened between 1870 and 1914 because the second and third generation of the Players were by then 'too busy becoming gentlemen'.¹⁰⁹

The chief obstruction to correctly understanding Coleman's otherwise perceptive essay is the clearly implied but generally false analogy between the game of cricket and the structure of management in British industry. In the famous and long-lasting *Gentlemen and Players*

107 Marshall, *Industry and Trade*, *passim*; on social stratification and its influence on consumer behaviour in a modern context see Kotler, *Marketing Management*, pp. 126 – 127.

108 Donald C. Coleman, 'Gentlemen and Players', *Economic History Review*, 26 (1), 1973, pp. 92– 98, 100 – 102, 105 – 107.

109 Coleman, 'Gentlemen', pp. 92– 98, 100 – 102, 105 – 107.

series of matches, a team of unpaid 'amateurs' played against a team of paid 'professionals'; ambiguous terms that Coleman neglected to delineate. Unfortunately, his casualness encouraged the reader to interpret 'amateur' not merely as non-professional, but as unprofessional in the sense of being untrained and incompetent, both 'gentlemanly' characteristics that formed one of the key aspects of his hypothesis. In reality, W. G. Grace, thought by many to be the finest cricketer of all time, was neither a public school pupil nor an Oxbridge graduate. Thus, at least as determined by Coleman's analogy, although he was a 'Gentleman' in terms of the game of cricket, he was a 'Player' in terms of his 'class'.¹¹⁰

As Coleman later maintained, his 'Gentlemen and Players' essay posed many questions and stated no firm conclusions. He was clear, moreover, that it offered no 'causal relationship' with 'entrepreneurial failure' and was not meant to disparage the 'great majority' of British managers who 'had never attended public schools and ancient universities'. Nevertheless, although he expressed surprise at 'its use by others to support much more sweeping contentions', he must surely have been aware of the appealingly provocative nature of many of its observations, and especially its connotations with the quintessentially English game of cricket.¹¹¹ Thus, predictably, other historians and scholars have made the 'gentlemen and players' analogy a key device in their attempts to illustrate the existence of snobbery and class distinction in British industrial firms, not just in the late nineteenth century, but in the post-Second World War era and after.

Hannah, for example, writing about British industry in the 1960s, asserted that 'the peculiar British tradition of (in cricketing terms) excluding professional 'players' from [family-controlled] board positions in favour of "gentlemen" amateurs [had] died slowly'. However, other than citing Coleman's essay in general, Hannah offered no evidence to support this assumption, thereby casting doubt on its veracity.¹¹²

Chandler, who was unequivocally in agreement with Hannah's position, extended the 'Gentlemen and Players' analogy even further, subtly altering the nature of its fundamental, but speculative, propositions in order to support his negative views of British family firms. Again citing Coleman as the only 'evidence' for his hypothesis, he claimed that in British industry there were two ranks of managers, the 'gentleman' and the 'players' – an amplification also assumed by Wilson and Thompson, who alluded to 'the traditional distinction between "gentlemen" at the head of a business and the "players" who performed the mundane managerial and supervisory tasks'. The former, Chandler asserted, were 'the sons of the founding fathers' (and therefore family members) while the latter were 'the

110 Lord Hawke, Lord Harris, Sir Home Gordon, *The Memorial Biography of Dr. W. G. Grace* (London: Constable, 1919), pp. 29, 135.

111 Donald C. Coleman, *Myth, History and the Industrial Revolution* (London: Hambledon Press, 1992), p. 123; also James Raven, 'British History and the Enterprise Culture', *Past and Present*, 123 (1), 1989, pp. 178 – 204.

112 Hannah, *Corporate Economy*, Second Edition, p. 88.

salaried managers, the practical men'. In his view, although the 'players' were competent administrators who had achieved their status through their ability, their main ambitions were to become 'gentlemen', and they therefore had little interest in the long-term growth and security of the firm.¹¹³

Writing in 1973, Derek F. Channon ascribed what he perceived as the relatively deficient state of British managers, their 'attitudes and ... level of technical competence', and their 'low degree of professionalism and effectiveness', to 'the persistent emphasis on social class'. The evidence offered for this assertion was that 'many directors [of British firms] had been educated at public schools and [at] Oxford or Cambridge' which, he proposed, 'reflected the relative immobility of the British social structure [and] tended to reinforce class barriers'. This situation created 'negative attitudes in worker-management relationships, characterized by a "them" and "us" dichotomy'. How and why a public school education created substandard managers was not made clear, and Channon's negative opinion of Oxbridge culture appears to have been based entirely on Anthony Sampson's somewhat whimsical, and anecdotal, caricature of British university life, replete with Wodehousian images of an 'unchanging calendar of boat-races, college balls and summer frolics'.¹¹⁴ In the absence of clear evidence or realistic examples, Channon's assertions were merely claims of value that, because they cannot be proven true or false, must be regarded with utmost circumspection.

Taking a somewhat different perspective on the snobbery and class distinction hypothesis, Wilson and Thompson pointed to the negative image created by 'evocative writings, such as Blake's "dark satanic mills" and Dickens' *Bleak House*' which, they claimed, 'associated [industry] with lower-class activities'. Such 'negative social attitudes' deterred even 'middle-class Britain' whose members preferred a career in 'the professions, and especially the "learned" professions, law and medicine, finance and commerce, and the civil service in Britain and the Empire' to a job in industrial management. The railway companies, on the other hand, had no such problems. These large-scale, vertically integrated enterprises not only 'recruited [managers] from upper middle-class backgrounds' they also undertook 'training [that] was mostly in-house and practical'. Nevertheless, Wilson and Thompson were adamant that 'one can easily exaggerate the impact of any innovations in British railway management, while the persistence of a "gentlemen and players" structure severely limited the elevation in [the] status of salaried managers'. However, outside these purportedly exceptional conditions, and especially in the engineering industries, a career in industry was not the first choice of anyone whose background could be considered much above proletariat. Such attitudes, suggested Wilson and Thomson, contrast with those in the

113 Chandler, *Scale and Scope*, pp. 292 – 294; Wilson and Thomson, *The Making of Modern*, p. 67.

114 Channon, *Structure of British Enterprise*, pp. 43 – 46; Anthony Sampson, *Anatomy of Britain Today* (London: Hodder and Stoughton, 1965), p. 224 – 225.

(purportedly egalitarian) United States where 'most of those who practiced mechanical engineering were from the upper middle class', while in Britain such things were 'of course' uncommon and consequently British engineers 'could never be described as an elite'.¹¹⁵

While it should be re-emphasized that the existence of imprecise and veiled phenomena like classism and snobbery are virtually impossible to establish or refute, some contradictory evidence exists that casts at least some doubt on the elitist hypothesis. Charles Parsons, the son of an earl and certainly therefore a member of the British 'upper class', graduated with a first class honours degree in mathematics at Cambridge university in 1877. He then joined Clarke, Chapman, an engineering firm on Tyne and Wear, as an apprentice, working there for several years before designing his revolutionary range of steam turbines. Harry Ricardo, designer of internal combustion engines and the founder of the global technology group Ricardo plc, came from a family of bankers. Born in 1885, and educated at Rugby, he was also a Cambridge graduate. Edwin Alliot Verdon Roe, founder of AVRO, was born in 1877. The son of a medical doctor, he served an apprenticeship at the Lancashire and Yorkshire Railway's locomotive factory at Horwich and later studied marine engineering at King's College, London.¹¹⁶ These well-known engineers and entrepreneurs were by no means the only British 'gentlemen' whose curricula vitae cast doubt on assumptions of classism and snobbery, as well as on allegations of 'amateurishness and stupidity'.¹¹⁷ As Broadberry and Crafts and others have suggested, to portray British management in such terms is an illusion created by attempts to discover 'simple answers to what is a complex problem'.¹¹⁸

Nepotism

Unlike most of the other shortcomings with which family firms are commonly indicted, nepotism is – or at least should be – precisely definable. According to Chambers Dictionary of Etymology, and therefore losing nothing in its transatlantic voyage, it is the practice of 'favouritism shown towards relatives [which] In its early use ... referred to the practice of popes and other church dignitaries of showing special favour to nephews or other relatives in

115 Wilson and Thomson, *The Making of Modern*, pp. 44 – 45, 57 – 58, 148.

116 A biography of Parsons can be found online at: <http://www.houseofdavid.ca/parsons.htm>; A biography of Ricardo can be found online at: <http://www.ricardo.com/en-gb/About-Ricardo/Our-History/>; A biography of Roe can be found online at: <http://www.ctie.monash.edu.au/hargrave/roe.html>; see also David Edgerton, *England and the Aeroplane, An Essay on a Militant Technological Nation* (London: Macmillan, 1991) p. 21; David Edgerton, *Science, technology and the British industrial 'decline', 1870 – 1970* (Cambridge: Cambridge University Press, 1996), pp. 25 – 28.

117 This point is made by S. B. Saul, 'The Mechanical Engineering Industries in Britain, 1860:- 1914', in Supple, *Essays*, p. 46.

118 S. N. Broadberry and N. F. R. Crafts, 'British Economic Policy and Industrial Performance in the Early Post-War Period', *Business History*, 38 (4), 1996, p. 70; also Nick Crafts, 'The Assessment: British Economic Growth Over the Long Run', *Oxford Review of Economic Policy*, 4 (1), 1988, pp. i – ii; David Edgerton, 'The Prophet Militant and Industrial: The Peculiarities of Correlli Barnett', *Twentieth Century British History*, 2 (3), 1991, pp. 378 – 379; Michael Sanderson, *The Universities and British Industry, 1850 – 1970* (London: Routledge and Kegan Paul, 1972), pp. 1 - 30; Michael Sanderson, 'The English Civic Universities and the "Industrial Spirit", 1870-1914', *Historical Research*, 61 (144), 1988, pp. 90 – 104; Rose, 'Investment in human capital', in Kirby and Rose, *Business Enterprise*, p. 339.

conferring office'. Expressly, it is not the same as patronage which, although it presumes the power to appoint people to vacant positions, has no familial or subjectively preferential connotations.¹¹⁹ Nepotism is not the same as 'inherited business ownership' or having friends and relatives working in senior positions, and nor is it merely a value-loaded term with 'a pejorative connotation'.¹²⁰ It is the unambiguous and illegitimate use of position; a malpractice that unfairly favours relatives or friends over all others, regardless of ability.

In the historiography in economic and business history, fallacious assumptions of the persistence of nepotism in British family firms are common. For example, in the censoriously unrestrained style available only to the Pulitzer Prize winner, and offering practically no supporting evidence, Chandler asserted that 'In the United States nepotism had a pejorative connotation [while in] Britain it was an accepted way of life'.¹²¹ Making a similarly sweeping and equally reproachful comparison, Payne fallaciously stated that 'In American companies ... one man was as good as another': unless, presumably, one was not a Native American, an African American, or an Asian American.¹²² Paraphrasing Chandler, he proposed that 'Nepotism among [American] professional entrepreneurs was frowned upon' whereas in Britain 'Leadership by inheritance applied in a great range of industrial activities', a practice that 'inhibited the ascent of the brilliant salaried official'. Ascribing this situation to the proliferation of family firms in certain industries, Payne suggested that 'the channels of advancement were blocked by family control'. Like Chandler, however, he submitted sparse evidence to support this assumption other than a reference to Habakkuk's, *American Technology in the Nineteenth Century*, and even this appears to have been quoted somewhat out of context. When Habakkuk referred to 'a haemorrhage of capital and ability from industry and trade' he did not attribute this to family firms and nepotism, but to what he described as 'sources of power and prestige besides business' such as 'bureaucracy, the army and the professions', that existed 'in other countries of Western Europe as well as in England'.¹²³ Moreover, when Habakkuk did refer specifically to nepotism he proposed that it came about as a symptom of 'purely economic circumstances' in Britain which, after the 1870s, had adversely, and temporarily, affected recruitment.¹²⁴

Patronage, according to Wilson and Thompson, 'must be distinguished from nepotism,

119 Chambers Dictionary of Etymology, s.v. "nepotism", "patronage".

120 The term 'inherited business ownership' is culled from Nicholas, 'Clogs to Clogs', pp. 688 – 689.

121 Chandler, *Scale and Scope*, p. 292.

122 On the mythical nature of American egalitarianism see, for example, Pyong Gap Min, ed., *Encyclopaedia of Racism in the United States* (Westport: Greenwood, 2005); Payne, 'Emergence', in Supple, *The Rise*, p. 374.

123 Payne, *idem*; H. J. Habakkuk, *American Technology in the Nineteenth Century, The Search for Labour-Saving Inventions* (Cambridge: Cambridge University Press, 1962), pp. 190 – 191; on the mythical nature of American egalitarianism see, for example, Pyong Gap Min, ed., *Encyclopaedia of Racism in the United States* (Westport: Greenwood, 2005).

124 Habakkuk, *American Technology*, pp. 212 – 213.

because in non-family firms directors regarded the ability to find employment for friends as part of their privileges'. Clearly, however, as the above-mentioned Chambers definitions show, this view is erroneous in that a licence to appoint friends, willy-nilly, to vacant positions is a key aspect of nepotism and an obvious malpractice. Referring to the early years of British industrialization as 'the personal stage of industrial capitalism, with families taking responsibility for creating, financing, and running the vast majority of firms' Wilson and Thompson suggested that 'Nepotism ... dominated recruitment patterns, with family members featuring at all levels of the organization'. Given that, 'the central issue was trust ... especially as professional managers were regarded as highly unreliable', it is unclear why they elected to use this pejorative term. Considering the perceptibly Chandlerian locus of their book, it is also rather odd that they draw on Adam Smith's *Wealth of Nations* and his distrustful observations regarding the eighteenth-century form of joint stock company *vis-à-vis* the virtues of the 'private copartnery' for authority. Moreover, if, as Smith asserted and Pollard contended, managers at that time were negligent, profuse and deceitful drunkards, it seems somewhat contrary to regard the employment of ostensibly more trustworthy friends and relatives as nepotism.¹²⁵

To refer to the employment of friends and relatives, regardless of the circumstances, as 'nepotism' is to misuse the term and to diminish its pejorative essence. Furthermore, it is logically unsound to assume that managers were untrained and incompetent simply because they were friends and relatives of the owners. As Tom Nicholas observed, there is little evidence to support such contentions, and while some case studies have produced evidence to substantiate recurrent 'dynastic downfall', others show that many British family managed firms enjoyed long-term success. Moreover, it cannot be asserted with complete confidence that all 'professional' managers, whether related to the owners or not, were well trained and efficient. It can, however, be argued that testimonials from tried and trusted colleagues or personal recommendations are the most reliable references, and there are clearly some distinct advantages in employing blood relatives. Fidelity and loyalty are more readily assured, as is the discipline derived from the availability of extracurricular and significantly more subtle sanctions.¹²⁶

Short-termism and Conservatism

Short-termism and conservatism, both relative terms, are among the most frequently presented explanations for assumptions of the deterioration of Britain's industrial dynamism. The scenario usually derives from comparisons, made at various stages between the late

125 Wilson and Thomson, *The Making of Modern*, pp. 52, 67; Adam Smith, *An Inquiry into the Nature And Causes of the Wealth of Nations*, <http://www.adamsmith.org/smith/won-b5-c1-article-1-ss3.htm>; Sidney Pollard, *The Genesis of Modern Management; a study of the industrial revolution in Great Britain* (London: Edward Arnold, 1965), p. 21.

126 Nicholas, 'Clogs to Clogs', pp. 688 – 713; Wilson and Thomson, *The Making of Modern*, p. 52; for specific examples of personal and familial 'guarantees' of fidelity see Alan McKinlay and Robbie Guerriero Wilson, 'Small acts of "cunning": Bureaucracy, inspection and the career, c. 1890 – 1914', *Critical Perspectives on Accounting*, 17, 2006, pp. 657 – 678.

nineteenth and the mid-twentieth centuries, between the size of Britain's largest companies and those of Germany, America, Japan and others. Typically, the outcomes of these evaluations deduce that British firms were unable to compete, either at home or abroad, because they were too small to realize the economic benefits of large-scale production. Developing and extending this line of reasoning, historians and scholars have interpreted these conditions as evidence of an unwillingness to accept change and a reluctance to progress and expand. Based on the hypothesis that many British firms were either family-owned and controlled or strongly influenced by familial interests, and bound up with assumptions of amateurism, classism, snobbery and nepotism, explanations for the persistence of small firms have centred on two main interrelated causes. The most often cited reason for a lack of growth is that family members, usually the descendents of the founder, awarded themselves overgenerous dividends and salaries, thus depriving family firms of the cash they needed in order to grow. Another recurring explanation is based on the perception that family managers were reluctant to raise investment capital because this would have involved the appointment of institutional representatives to the board of directors, thereby allowing 'outsiders' to participate in management. In essence, family directors and managers are accused of viewing their firms as a source of income, a provider of secure employment, and a vehicle for social recognition, rather than a responsibility to be altruistically cultivated for the benefit of others.

Perceptions of the 'cash cow' interpretation of short-termism are by no means new to the historiography in economic thought or economic history. As early as 1920, Alfred Marshall referred to an article in *The Times* which had reported, somewhat anecdotally, that *some* of the descendents of the founders of *some* west country textile manufacturers were, having retired from business, living on rural estates. Ostensibly, and arguably, a step towards the 'separation of ownership and management' Marshall viewed such developments as evidence of a 'falling off among the trading classes of this country from the more energetic practice of former periods'.¹²⁷ In similar vein, Mathias asserted that, by the late nineteenth and early twentieth century, 'the mill was mainly thought of as the provider of revenues ... rather than as the centre of ambitions of the industrialist'.¹²⁸ Initially ascribed to the sociopolitical ambitions of Victorian and Edwardian family owners, short-termism has also been offered as evidence to explain the perceived shortcomings of British industry during the mid-twentieth century.¹²⁹ Chandler described the intervallic disbursement of profits as one of British industry's weaknesses, alleging that it stemmed from 'owner-managers' who 'often preferred to payout profits in current dividends rather than reinvesting them in the firm for long-term

127 "Decay of a famous industry", *The Times*, 19 December 1904, quoted in Marshall, *Industry and Trade*, p. 68; Chandler and Daems, 'Rise of Managerial Capitalism', in Daems and van der Wee, *Rise of Managerial Capitalism*, p. 6.

128 Mathias, *First Industrial*, p. 385; this tendency was also stressed in Coleman, 'Gentlemen', p. 110.

129 Stressed, for example, in Coleman and Macleod, 'Attitudes', pp. 588 – 611.

growth'. According to Chandler, short-termism was one of the main reasons why, compared to American managerial enterprises, 'British firms remained smaller and more personally managed [and] they often failed to develop the facilities and skills necessary to grow by expanding into new markets abroad or into related industries'.¹³⁰ Curiously, this view runs counter to Channon's somewhat unconvincing and totally insupportable suggestion that, among the 'several reasons for Britain's weakness' compared to the United States, was 'the fact that [in British family firms] high profits were considered somehow immoral'.¹³¹

The xenophobia hypothesis seems to have developed somewhat later and from a limited number of mainly general sources published in the 1920s and 1930s including Clapham's much-cited *An Economic History of Britain*.¹³² Aldcroft and Richardson, for example, drew on Clapham as well as Sturme's narrowly focused *British Shipping and World Competition* for their assertion that British 'Firms remained small through lack of finance only in so far as family entrepreneurs were reluctant to enter the capital market for fear of letting in "foreign" control': a view nuanced by others including Church, Payne, Wilson and Thompson, and argued *ad nauseam* by Chandler.¹³³ Others, however, have proposed that concerns about 'outsiders' in the late nineteenth and early twentieth century may well, at least in some cases, have been warranted, and as Geoffrey Jones and others have suggested, for many firms, 'going public' in the post-Second World War era led to short-termism of a different kind.¹³⁴

Short-termism and conservatism are both imprecise and somewhat bifurcated concepts. Because they can only be assumed, the parameters of 'long-term' and 'short term' are never specified, and the mutual exclusivity of investment for growth and the regular payment of dividends are never substantiated.¹³⁵ In response to such assertions, it can be argued that the primary purpose of enterprise is to generate profits, and that individuals and institutions that invest in firms do so in the expectation of realizing a premium. It is questionable, therefore, whether shareholders – either family members or others – would be satisfied with

130 Chandler, *Scale and Scope*, pp. 298, 310, 348, 390.

131 Channon, *Structure of British Enterprise*, pp. 16, 225.

132 J. H. Clapham, *An Economic History of Britain*, vols. 1 – 3 (Cambridge: Cambridge University Press, 1926 - 1938); on the relevance of this and other sources see Coleman and Macleod, 'Attitudes', pp. 588 – 589.

133 Aldcroft and Richardson, *British Economy*, p. 164; S. G. Sturme, *British Shipbuilding and World Competition* (London: Athlone, 1962); Roy Church, 'Family and Failure: Archibald Kenrick and Sons Ltd., 1900 – 1950', in Supple, *Essays*, p. 121; Chandler, *Scale and Scope*, p. 286 and *passim*; Payne, 'Emergence', in Supple, *The Rise*, p. 370; Wilson and Thomson, *The Making of Modern*, pp. 41, 146, 258 – 260.

134 Lucy Newton, 'Capital networks in the Sheffield region, 1850 – 1885', in Wilson and Popp, *Industrial Clusters*, pp. 134 – 135; Geoffrey Jones, 'Global perspectives and British paradoxes', *Business History Review*, 71 (2), 1997, pp. 291 – 299.

135 Church, 'The family firm in industrial capitalism', p. 3; Aldcroft and Richardson, *British Economy*, p. 184.

'increased assets' and 'long-term tenure for managers and ... workers' instead.¹³⁶ As Penrose emphasized, the profit motive is more important than growth and the 'attainment of [other "objectives"] is associated directly with the ability to make profits'.¹³⁷ Moreover, as Owens logically demonstrated, to suggest that the distribution of dividends somehow jeopardized firms' viability is clearly unreasonable, because family owners of firms on which their future prosperity depended obviously had a stake in their survival.¹³⁸ There are, furthermore, sound commercial reasons relating to firms' reluctance to expand beyond the optimum size in relation to markets that they serve. While large-scale firms may benefit from technical economies of scale in some industry sectors, in others the level of demand favours small or medium-sized enterprises, and in such cases increased capacity would simply result in diseconomies.¹³⁹

VI Perceptions of the British Manufacturing Engineering Industry

In addition to the range of alleged family firm weaknesses, other evidence to explain assumptions of British industrial decline has been drawn from perceived shortcomings in the British manufacturing engineering sector. Again largely centred on assertions of late-nineteenth and early twentieth-century industrial retardation, the general hypotheses offer various causal connections with alleged entrenched weakness and inherently flawed technology evidenced by a failure to devise more productive manufacturing systems, and compounded by a reluctance to adopt the superior technology developed by other more inventive cultures. Arguments to support the backward technology concept are usually based on the premise that, although Britain was the world's leader in manufacturing engineering technology at the time of the Industrial Revolution, during the nineteenth century, newly industrialised nations, particularly America and Germany, developed superior manufacturing techniques and more advanced machine tools so that, by 1914, they had moved ahead of Britain in a number of important industry sectors. This scenario is then extended to include the rest of the twentieth century during which Britain is perceived to have continued to fall behind, a trend that culminated in a series of major crises during the nineteen-seventies and the subsequent 'deindustrialization' of the world's first industrial nation.

Usually based on comparisons with America, the obsolete systems theory holds that the most progressive innovations and techniques were created, and became established

136 Chandler, *Scale and Scope*, p. 390.

137 Edith Penrose, *The Theory of the Growth of the Firm* (Oxford: Oxford University Press, 1959), p. 30.

138 Alistair Owens, 'Inheritance and the Life-Cycle of Family Firms in the Early Industrial Revolution', *Business History*, 44 (1), 2002, pp. 21 – 46; For an illuminating discussion on the 'the extended horizons of family firms' see Harvey S. James Jr., 'Owner as Manager, Extended Horizons and the Family Firm', *International Journal of the Economics of Business*, 6 (1), 1999, pp. 41 – 55.

139 Barback, *The Firm*, pp. 142 – 145; E. Victor Morgan, *Economics* (London: Pitman, 1973), pp. 113 – 123; Bhaskar, *The Future*, p. 251; French, 'Public Policy and British Commercial', p. 38.

practice, in the United States, whereas Britain's manufacturing engineering firms continued to embrace outdated methods and systems. Such assertions are often centred on the advent of an 'American Invasion' when an influx of goods of all types, including relatively large numbers of machine tools, entered Britain from the USA during the 1890s. Why this should be accepted as evidence of British engineering backwardness is not clear, and it certainly casts doubt on suggestions that British firms were reluctant to embrace 'superior American methods'. An analysis of around 160 machine tools purchased by Gardner between 1905 and 1912 shows that most were British, and although many were of American origin, these do not appear to have been especially advanced, and the most innovative and sophisticated were a small number of German built automatic gear cutting machines. (see Appendix 1) Moreover, given the highly cyclical nature of the machine tool market, there could well be a more straightforward explanation for the 'America invasion' than those routinely offered.¹⁴⁰

The American System

Perhaps the most extravagant of these claims relate to the now largely discredited, but still occasionally cited, concept of a unique 'American system' (usually of manufacture, manufacturing or manufactures), which is supposed to have begun in Massachusetts in the late eighteenth century and which had matured into a discrete and highly efficient production paradigm by the mid-nineteenth century.¹⁴¹ Inference is drawn from interpretations of historical events; particularly the Great Exhibition of 1851 in London and the subsequent purchase of a quantity of American built machine tools for installation at a newly constructed British government arms factory. The hypothesis advanced is that visitors to the Crystal Palace exhibition were greatly impressed by the quality of American weapons and other goods exhibited there. Consequently the government, which was at that time planning to build a plant at Enfield for the production of muskets and rifles, decided to send a team of experts to America to obtain first hand knowledge of American manufacturing methods. During their tour of inspection, they became aware of the superior nature of American production techniques in a range of industries, so much so that they immediately recommended that the Enfield plant be equipped almost exclusively with American machine tools. Some scholars have presented this, and an assortment of contiguous evidence, as

140 S. B. Saul, 'The American Impact on British Industry 1895-1914', *Business History*, 3 (1), 1960, pp. 19 – 38.

141 Roe used 'manufacture' Joseph Wickham Roe, *English and American Tool Builders* (New Haven: Yale University Press, 1916), p. 129; others used 'manufacturing', for example John E. Sawyer, 'The Social Basis of the American System of Manufacturing', *Journal of Economic History*, 14 (4), 1954, pp. 361-379; also Alfred D. Chandler Jnr. 'The Enduring Logic of Industrial Success', in Supple, *The Rise*, p. 240; others used 'manufactures', for example Nathan Rosenberg, ed., *The American System of Manufactures, The Report of the Committee on the Machinery of the United States, 1855, and the Special Reports of George Wallis and Joseph Whitworth 1854* (Edinburgh: Edinburgh University Press, 1969), pp. 1 – 86; also Otto Mayr and Robert C. Post, eds., *Yankee Enterprise, The Rise of the American System of Manufactures* (Washington DC: Smithsonian Institution Press, 1981); also Jonathan Zeitlin, 'Between flexibility and mass-production: strategic ambiguity and selective adaptation in the British engineering industry, 1830-1914', in Charles F. Sabel and Jonathan Zeitlin, eds., *World of Possibilities, Flexibility and Mass Production in Western Industrialization* (Cambridge: Cambridge University Press, 1997), pp. 241, 252.

irrefutable proof that manufacturing engineering technology was, at that time, more advanced in America than in Britain.

Accounts of American exhibits at Crystal Palace, including 'Colonel' Samuel Colt's revolvers, Robbins and Lawrence's rifles, and McCormick's agricultural equipment, are presented as evidence of the existence in America of the means to produce, without the use of skilled workers, large quantities of standardized, high-quality goods. It has also been claimed that, when these were seen at the Great Exhibition in 1851, the term 'American system' was 'promptly' created to exemplify their 'novel and original' attributes.¹⁴² Such assertions, however, are difficult to sustain, and the origins of the expression 'American system' are somewhat obscure.¹⁴³ The earliest use appeared in *The Report of the Committee on the Machinery of the United States*, compiled by a group of British government representatives following their visit to America in 1855.¹⁴⁴ It also appeared in James Nasmyth's autobiography, edited by Samuel Smiles, written in 1863 and published some years later, but neither of these sources attributed any specific qualities or characteristics in any acceptable way.¹⁴⁵ More tangible references can be found in late nineteenth-century publications. For example, in 1881, a Manchester-based firm was advertising itself as a manufacturer of 'Special machinery for wood working; line shaft fittings on the 'American system''.¹⁴⁶ Other references, used to denote specific variations in the details and arrangements of machinery, such as mill gearing and lathe beds, appear in technical reference books, but none of these convey a set of features in the context adopted in later scholarly works.¹⁴⁷

The first historiographical work to describe the 'American system' in paradigmatic terms was published in 1916 by Joseph Wickham Roe who asserted that it was 'The system of interchangeable manufacture' which embodied 'the art of producing complete machines or

142 Rosenberg, *The American System of Manufactures*, pp. 1 – 86, esp. p. 5; also, Merritt Roe Smith, 'Military Entrepreneurship', in Mayr and Post, *Yankee Enterprise*, p. 64; Ferguson, 'History and Historiography', in Mayr and Post, *Yankee Enterprise*, p. 1; David A. Hounshell, *From the American System to Mass Production, 1800 - 1932, The Development of Manufacturing Technology in the United States* (Baltimore: Johns Hopkins University Press, 1984), p. 16.

143 'The exact point of origin is elusive ... as is the first use of the term by historians' Ferguson, 'History and Historiography', p. 1 – 23; also Mayr and Post, *Yankee Enterprise*, pp. xv – xx.

144 The complete sentence reads, 'After having heard what was said at the Parliamentary Committee, by those who were opposed to the New Armoury, and having now seen the American system in operation, the Committee are of opinion that the expectations which were held out to result from the proposed Armoury will be more than realized'. Rosenberg, *The American System of Manufactures*, p. 66.

145 'The (British) Government resolved to introduce the American system, by which Arms might be produced much more perfectly, and at a great diminution of cost'. James Nasmyth, *James Nasmyth: Engineer: An Autobiography*, edited by Samuel Smiles (New York: John Murray, 1897), p. 260; It may be significant, however, that Smiles made no mention of this remark in his *Industrial Biography*, published in 1863, in which he dedicates a chapter to Nasmyth. Samuel Smiles, *Industrial Biography, Iron Workers and Tool Makers* (London: Murray, 1863).

146 'Richards and Atkinson, 7 Blackfriars St., Salford. Special machinery for wood working; line shaft fittings on the American system'. *Slater's*, 1881, p. 78.

147 For example, Henry J. Spooner, *Machine Design, Construction and Drawing* (London: Longmans, Green and Co., 1917), pp. 384 – 387.

mechanisms, the corresponding parts of which are so nearly alike that any part may be fitted into any of the given mechanisms'. According to Roe, the 'American System' had been adopted by Eli Whitney to facilitate the production of muskets for the American army in 'about 1800'. His vague descriptions of Whitney's methods and machinery were limited mainly to a proposal to use 'machinery moved by water' to reduce the number of workers required, and his portrayal of Samuel Colt's plant at Hartford, Connecticut, built in 1854 – 1855, was only slightly less ambiguous. Colt, he suggested, 'adopted the principles of interchangeable manufacture ... in a most advanced form', and equipped his factory with 'automatic and semi-automatic machinery' which 'practically eliminated' manual labour. However, only two of these machines are described: one was 'A type of manufacturing miller ... still known as the Lincoln miller', and the other was 'a type of hammer' operated 'first by a set of dogs, later by a central screw' but not at any time without 'the operator [who] walked around the machine'.¹⁴⁸ Unsurprisingly, other scholars have defined the 'American system' somewhat differently, often referring to 'uniformity' in the same or similar context as 'interchangeability'.¹⁴⁹

According to H. J. Habakkuk, the 'American system' embodied various techniques, but its most important function was a reduction in the use of manual labour. In reaching this assumption, he proceeded from the questionable premise that 'mechanization, standardization and mass-production ... appeared (in America) before 1850'. Placing less emphasis on interchangeability, the development of which he attributed to Whitney and North, Habakkuk accepted only that it may have contributed to 'the early mechanization of the US arms industry', and that the use of 'very specialized' machine tools was a more significant feature of the 'American system'.¹⁵⁰ Nathan Rosenberg, who appears to be the first academic to have used the complete expression 'American System of Manufacturing',

148 Roe, *English and American*, pp. 128 – 129, 132 – 133, 137.

149 For example 'uniformity was assured by the use of jigs and fixtures'. Edward Ames and Nathan Rosenberg, 'The Enfield Arsenal in Theory and History', *Economic Journal*, 78, 1968, p. 840 (note); 'Lee adopted ... North's ... "uniform system of manufacture." Edwin A. Battison, 'A New Look at the Whitney Milling Machine', *Technology and Culture*, 14 (2), 1973: p. 593; 'without greater uniformity of parts further multiplication of output would entail massive problems'. David A. Hounshell, 'The System: Theory and Practice', in Mayr and Post, *Yankee Enterprise*, p. 136; also Hounshell, *American System to Mass Production*, pp. 1 – 65; Robert A. Howard, 'Interchangeable Parts Re-examined: The Private Sector of the American Arms Industry on the Eve of the Civil War', *Technology and Culture*, 19 (4), 1978, pp. 633 – 649; Rosenberg, *The American System of Manufactures*, pp. 1 – 86; Merritt Roe Smith, 'John H. Hall, Simeon North, and the Milling Machine: The Nature of Innovation among Antebellum Arms Makers', *Technology and Culture*, 14 (2), 1973, pp. 573 – 59; Merritt Roe Smith, 'Military Entrepreneurship', in Mayr and Post, *Yankee Enterprise*, pp. 63 – 102; Robert S. Woodbury, 'The Legend of Eli Whitney and Interchangeable Parts', *Technology and Culture*, 1 (4), 1960, pp. 235 – 253.

150 Habakkuk, *American Technology*, pp. 5, 104 - 107, 151; on the issue of US labour scarcity also E. Rothbarth, 'Causes of the Superior Efficiency of USA Industry Compared with British Industry', *Economic Journal*, 56, 1946, pp. 383 – 390; for a spectacularly chauvinistic depiction of the superiority of early American machine tool technology see Pamela Lowry, 'The Development of American Machine Tools', *Executive Intelligence Review*, 33(25), 2006: 44 – 55.

included the use of automatic machinery amongst its constituent qualities, but placed more emphasis on interchangeable parts and the use of gauges.¹⁵¹ Among a range of non-technical qualities attributed to the 'American system' are intangible aspects such as good housekeeping and amicable employee relations.¹⁵²

From the above sources, and especially from the works of Roe, Rothbarth, Habakkuk and Rosenberg, a concept of the 'American system', as depicted in historiographical literature, can be formulated. In essence, it was an approach to the manufacture of mechanical devices based on the elimination of hand fitting during assembly. This was accomplished through the production of interchangeable components by the extensive use of automatic, semi-automatic and special machine tools, together with specially made limit gauges. Either as an indirect benefit, or as its primary purpose, the 'American system' greatly reduced the need for firms to employ skilled workers. Moreover, although it was first envisaged as a method for the production of small arms, its distinct advantages made the 'American system' attractive to manufacturers of other machinery. Its use, therefore, was widely adopted in the United States, giving firms such as McCormick and Singer distinct advantages over their competitors. It later spread to other parts of the industrialised world, becoming a paradigm of efficient manufacturing engineering practice, and forming the basis for modern mass-production.¹⁵³

Some historians and scholars have cast doubts on several of the assumptions surrounding the concept of an 'American system', and for Rosenberg, 'The notion that the system of interchangeable parts sprang full-blown from Whitney's genius in musket manufacture has now been accorded a decent burial'.¹⁵⁴ George H. Daniels concurred, writing in 1970 that 'no one except writers of American history textbooks believes any longer that a complete system of interchangeable-parts manufacture sprang full-blown from the mind of Eli Whitney'.¹⁵⁵ In probably the most detailed and comprehensive study of the 'American system' ever undertaken, David A. Hounshell concluded that Whitney never achieved interchangeability, one of its core characteristics. Moreover, he also questioned whether this was achieved by American manufacturers either as easily, or as early, as some have claimed. Drawing on the essays of Robert S. Woodbury, Edwin A. Battison, and others, as well as on empirical sources, Hounshell also found that the pursuit of interchangeability in the mid-nineteenth century did not lead to lower production costs in the manufacture of small arms, and nor did

151 Rosenberg, 'Technological Change', pp. 414 – 443; Rosenberg, *The American System of Manufactures*, pp. 1 – 86.

152 See for example Daniel Nelson, 'The American System and the American Worker', in Mayr and Post, *Yankee Enterprise*, pp. 171 – 187.

153 Chandler, 'American System and Modern Management', in Mayr and Post, *Yankee Enterprise*, p. 169.

154 Rosenberg, 'Technological Change', p. 427.

155 George H. Daniels, 'The Big Questions in the History of American Technology', *Technology and Culture*, 11, 1970, p. 13.

he discover any evidence to support the commonly held perception that the system of interchangeability had spread to several sectors of the American manufacturing industry before the twentieth century.¹⁵⁶ In some respects Hounshell's findings were confirmed by Wayne Lewchuk who suggested that, although interchangeability was realized in the mid-nineteenth-century American small arms industry, it was achieved 'slowly and at great cost', to a limited degree, and mainly through the application of wider tolerances and the acceptance of looser fits. In general terms, he proposed, firms operating the 'American system' were unable to compete, either on price or volume supply, with firms using the equally nebulous 'European system' of craft-production.¹⁵⁷

Other and much earlier sources, including a treatise published in America in 1921 by Earle Buckingham, an engineer employed by Pratt and Whitney, also cast doubt on assertions that interchangeability had become established in the USA by the mid-nineteenth century. This work strongly indicates that, at the time of its publication, interchangeability was still largely an aspiration, and although he proposed that 'interchangeable manufacturing is closely interwoven with many distinctly American manufacturing methods and processes' he did not refer to it as the 'American system'.¹⁵⁸ Nor did Buckingham ascribe its origins to any particular person, firm, or branch of industry: a noteworthy omission in view of Roe's claim that 'Francis A. Pratt ... and Amos Whitney ... who later founded the firm of Pratt and Whitney' were instrumental in the development of the 'American system'.¹⁵⁹ In fact, Buckingham, a specialist in interchangeability, believed that 'Different plants working along independent lines ... often achieved [interchangeability] by widely different methods'.¹⁶⁰

Another, somewhat less emphasized, aspect of the 'American system' concerns claims that early American manufacturing engineers developed advanced equipment such as turret lathes and milling machines.¹⁶¹ However, as the work of Edwin A. Battison, Merritt Roe

156 Hounshell, *American System to Mass Production*, pp. 3, 6 – 10; Hounshell, 'Theory and Practice', in Mayr and Post, *Yankee Enterprise*, pp. 127 – 152; Woodbury, 'Legend of Eli Whitney', pp. 235 – 253; Battison, 'A New Look', pp. 592 – 598; also Ferguson, 'History and Historiography', in Mayr and Post, *Yankee Enterprise*, pp. 1 – 23; Smith, 'John H. Hall, Simeon North', pp. 573 – 591; Also Howard, 'Interchangeable Parts Re-examined', pp. 633 – 649.

157 Lewchuk, *American Technology*, pp. 1, 33 – 34; Also Gordon Boyce and Simon Ville, *The Development of Modern Business* (Basingstoke: Palgrave, 2002), p. 151.

158 Earle Buckingham, *Principles of Interchangeable Manufacturing, A Treatise on the Basic Principles Involved in Successful Interchangeable Manufacturing Practice Covering Design, Tolerances, Drawings, Manufacturing Equipment, Gauging and Inspection* (New York: The Industrial Press, 1921), pp. v – vi.

159 Roe, *English and American*, p. 132 – 133.

160 Buckingham, *Principles of Interchangeable Manufacturing*, p. v.

161 Roe, *English and American*, p. 142; Habakkuk, *American Technology*, p. 105; S. B. Saul 'The Engineering Industry', in Derek H. Aldcroft, ed., *The Development of British Industry and Foreign Competition, 1875 – 1914* (London: George Allen and Unwin, 1968), p. 235; Rosenberg, *The American System of Manufactures*, p. 62; Daniels, 'The Big Questions', p. 12; Russell I. Fries, 'British Response to the American System: The Case of the Small-Arms Industry after 1850', *Technology and Culture*, 16 (4), 1975, p. 391; Saul, 'Mechanical Engineering Industries', in Supple, *Essays*, p. 33; A. E. Musson, 'British Origins', in Mayr and

Smith, Paul Uselding, and Robert S. Woodbury have shown, the origins of these machine tools are far from clear.¹⁶² Moreover, neither was as innovative as Habakkuk has suggested, at least not in their original, mid-nineteenth-century form. Milling, a technique whereby the work-piece is clamped and the cutting tool is rotated, certainly took place long before the term 'milling' was coined, and, as L. T. C. Rolt has accurately described, milling was routinely performed on centre lathes before the advent of specialized milling machines, and machine tools designed in Britain specifically for milling operations predate even the dubious 'Whitney miller'.¹⁶³ Described in Samuel Smiles' *Industrial Biography* as 'a machine with revolving cutters to plane metallic surfaces' capable of machining 'straight, smooth, and parallel surfaces on wood and other materials requiring truth' and which used 'tools ... fixed on frames driven by machinery ... moving in a rotary direction', patented in 1802 by Joseph Bramah, and used by him in his lock factory at Pimlico at around the same time, was undoubtedly a milling machine.¹⁶⁴ Furthermore, a 'self acting', 'nut cutting' machine, designed and built in 1829 by James Nasmyth while he was employed as Henry Maudslay's personal assistant, and built in series by him in Manchester which used 'a hard steel circular cutter' to automatically produce the six flat sides of hexagon nuts was also, clearly, a milling machine.¹⁶⁵ Anecdotally, several American, British and German lathe manufacturers have claimed, either openly or tacitly, to have invented the turret which, in its original form, was an attachment for centre lathes.

The Optimum Scale of Production

Hypotheses of a 'second industrial revolution', one of the most entrenched concepts in the historiography in economic and business history, are rooted in assertions that, at the end of the nineteenth century, large scale enterprises emerged as a result of growing demand for

Post, *Yankee Enterprise*, p. 27; Nathan Rosenberg, 'Why in America?', in Mayr and Post, *Yankee Enterprise*, p. 58; Hounshell, *American System to Mass Production*, pp. 1 – 65; Nathan Rosenberg, *Perspectives on Technology* (Cambridge: Cambridge University Press, 1976).

162 For example, 'The exact origins of the milling machine are shrouded in obscurity', Rosenberg, *The American System of Manufactures*, p. 70; Battison, 'A New Look', pp. 592 – 598; Smith, 'John H. Hall, Simeon North', pp. 573 – 591; Uselding, 'Elisha K. Root', pp. 543 – 568; Paul Uselding, 'Measuring Techniques and Manufacturing Practice', in Mayr and Post, *Yankee Enterprise*, pp. 103 – 126; Woodbury, 'Legend of Eli Whitney', pp. 235 – 253; Also A. E. Musson and Eric Robinson, *Science and Technology in the Industrial Revolution* (Manchester: Manchester University Press, 1969), pp. 473 – 509, esp. pp. 490 – 491.

163 L. T. C. Rolt, *Tools for the Job: A Short History of Machine Tools* (London: Batsford, 1965), pp. 108 – 109, 129, 154; Woodbury, 'Legend of Eli Whitney', p. 250.

164 Samuel Smiles, *Industrial Biography, Iron Workers and Tool Makers* (London: J. Murray, 1863), pp. 91 – 92; Although Rolt's opinion, based on five surviving cutters, was that these 'represent the germ of the idea of the milling machine' this view ignores the naïve, but clear testimony of Smiles' description. Rolt, *Tools*, p. 85.

165 Nasmyth, *Autobiography*, p. 111; This machine is also described in Musson and Robinson, *Science and Technology*, pp. 490 – 491; and in Woodbury, *Milling Machine*, pp. 24 – 26; and in J. A. Cantrell, *James Nasmyth and the Bridgewater Foundry, A study of entrepreneurship in the early engineering industry* (Manchester: The Chetham Society, 1985), pp. 96 – 100; Specifically excluding Nasmyth's machine, Gilbert erroneously proposed that 'the importation of the Enfield Machinery also constituted the introduction to England of the milling process'. Gilbert, 'The Ames Recessing Machine', pp. 210 – 211.

products related to the internal combustion engine, electricity generation equipment, chemicals, and 'light machinery'.¹⁶⁶ According to Chandler, 'In order to benefit from the cost advantages of ... high-volume technologies of production, entrepreneurs had to make three sets of interrelated investments'. These he described as the 'three-pronged investment in production, distribution, and management that brought the modern industrial enterprise into being'. Production facilities, especially 'mass-production [that] grew after the 1880s' needed to be 'large enough to exploit a technology's potential economies of scale or scope' and were thus 'capital-intensive'. However, although some British firms endeavoured to enter these markets, 'their investments in production were usually large enough to benefit from the economies of scale and scope but often not large enough to utilize their full potential'. Moreover, characteristically citing his own work, Chandler asserted that 'In machinery, the British did not even try' and while German manufacturers 'quickly dominated the production of heavy processing machinery', the Americans 'acquired a near global monopoly in machinery which was produced in volume'.¹⁶⁷

If definitions of concepts like 'family firm' and the 'American system' seem ambiguous, those relating to 'mass-production' are omnifarious by comparison. The expression appears to have originated in 1925 when an article published in the *New York Times* described mass-production as 'single-purpose manufacture combined with the smooth flow of materials; the assembly line; large-volume production; high wages initiated by the five-dollar day; and low prices'. Its clear association with passenger cars, especially Henry Ford's scheme 'to make automobiles ... all alike ... just as one pin is like another pin, when it comes from the pin factory' appears to have 'led to its widespread use and identification with the assembly line manufacturing techniques'. Although it excluded firms that manufactured goods in large quantities without adopting automation and unskilled workers, and included the production of simple items like nuts and bolts, the model propounded more recently by Michael J. Piore and Charles F. Sabel as 'the use of special-purpose (product-specific) machines and of semiskilled workers to produce standardized goods', at least had the advantage of clarity.¹⁶⁸

While the ability of mass-production methods to manufacture complex mechanical equipment at low prices for a large and expanding market is clearly a significant advantage,

166 Chandler, *Scale and Scope*, p. 250; Chandler, *Strategy and Structure*, p. 386; also Hobsbawm, *Industry and Empire*, pp. 173 - 178; Mathias, *First Industrial*, pp. 376 - 385; Jeremy, *Business History of Britain*, pp. 81 - 83; Roderick Floud and D. N. McCloskey, eds., *The Economic History of Britain Since 1700*, Second Edition, Vol. 2, 1860 - 1939 (Cambridge: Cambridge University Press, 1994), pp. 64 - 70; Wilson, *British Business*, p. 7; Boyce and Ville, *Development of Modern Business*, pp. 151, 155.

167 Chandler, *Scale and Scope*, pp. 3, 235 - 392; Alfred D. Chandler Jr., 'Managerial enterprise and competitive capabilities', *Business History*, 4 (1), 1992, p. 5; Chandler and Daems, 'Rise of Managerial Capitalism', in Daems and van der Wee, *Rise of Managerial Capitalism*, p. 8; Alfred D. Chandler Jr., 'The Enduring Logic of Industrial Success', in Barry E. Supple (ed.), *The Rise of Big Business*, (London: Edward Elgar, 1992), p. 240.

168 Hounshell, *American System to Mass Production*, pp. 1, 273; Dewey, *War and Progress*, p.100; Chandler, *Visible Hand*, p. 270; Michael J. Piore and Charles F. Sabel, *The Second Industrial Divide: Possibilities for Prosperity* (New York: Basic Books, 1984), p. 2.

it also incorporates a number of inherent weaknesses. Some of these have been illuminated in the history of the Ford Motor company, especially in scholarly examinations of Ford's Highland Park and Rouge River plants and of the vast number of specially designed machine tools installed there to produce the famous Model T. Although these innovative facilities soon made Ford a point of reference against which other passenger car builders measured their mass-production efficiencies, they later became an example of the limitations of overspecialization. Planned and equipped to produce large volumes at extraordinarily low costs, when the Model T's popularity declined, the introduction of its replacement could only be achieved by completely re-equipping the Rouge River plant, a process that necessitated its closure for approximately a year. Thus, according to Hounshell, 'Ford and his production experts had driven mass-production into a deep cul-de-sac' and for this reason, 'Ford proved incapable of making a smooth transition to a new model'. While some have interpreted these outcomes as stagnation resulting from a deliberate trade-off between low unit cost and technical progress, others believe that they were simply the inevitable, but unforeseen, results of inflexible production technology. Either way, it is a clear demonstration that low price does not always secure a firm's market position and that mass-production in its purest manifestation can engender serious rigidities.¹⁶⁹

At the opposite end of the scale, 'craft-production' is perhaps more clearly definable. According to Womack, Jones, and Roos, it is characterized by the employment of skilled craftsmen using multi-purpose machinery for the manufacture of either 'bespoke' single items, or batches of items in very low quantities, especially where 'the scale of production is limited and the range of ... products is mixed and variable'. Many historians, including Gilbert, Aldcroft, Boyce and Ville, have associated craft-production with obsolete practices used in the early period of the Industrial Revolution, and thus with high costs and inefficiency, deductions which are clearly illogical and unsound. On the one hand, skilled craftsmen using universal machine tools are as capable of producing large volumes of interchangeable components as are semiskilled and unskilled workers using single- and special-purpose machines: on the other hand, craft-production has discernable market values in that it is universally associated with high-quality, allowing firms using it to command

169 Hounshell, *American System to Mass Production*, pp. 1, 9, 12, 215, 227 – 228, 230 – 233, 311 – 331; Richard N. Langlois and Paul Robertson, 'Explaining Vertical Integration: Lessons from the American Automobile Industry', *Journal of Economic History*, 49 (2), 1989, pp. 366 – 367; Philip Scranton, 'Technology, Science and American Innovation', *Business History*, 48 (3), 2006, pp. 311 – 331; William Lazonick, *Business Organization and the Myth of the Market Economy* (Cambridge: Cambridge University Press, 1991); William J. Abernathy, *The Productivity Dilemma, Roadblock to Innovation in the Automobile Industry* (Baltimore, Johns Hopkins University Press, 1978), pp. 3 – 6; Reinhard Seiffert, 'Das Auto im Wandel der Zeit', in *Aller Welt*, p. 45; Langlois and Robertson, 'Explaining', pp. 370; Haruhito Shiomi, 'Introduction', in Haruhito Shiomi and Kazuo Wada, eds., *Fordism Transformed, The Development of Production Methods in the Automobile Industry* (Oxford: Oxford University Press, 1995), pp. 1 – 7; David A. Hounshell, 'Planning and Executing "Automation" at Ford Motor Company, 1945 – 65: The Cleveland Engine Plant and its Consequences', in Shiomi and Wada, *Fordism Transformed*, p. 51.

premium prices.¹⁷⁰

Sandwiched between mass-production and craft-production there undoubtedly existed a range of manufacturing systems, which, according to some scholars, comprised an infinitely variable array of hybrid solutions applied to everyday problems in most engineering factories and workshops. Unfortunately, attempts to subdivide them into a set of rigid categories have occasionally led to technical and logical fallacies and oxymoronic expressions such as 'flexible mass-production' that used 'flexible, multipurpose machine tools', all of which, because they lack consistency, are fundamentally unsatisfactory. Nevertheless, there can be no doubt that mass-production and craft-production, however defined, were not the only systems accessible, and nor was mass-production the only profitable method used by manufacturing engineering firms either before, during, or after the 'second industrial revolution'.¹⁷¹

Flexible Specialization

Writing in 1984, Piore and Sabel described 'Flexible Specialization' as the use of 'flexible-multi-use-equipment [and] skilled workers'. Operating within a politically created 'industrial community that restricts the forms of competition to those favouring innovation' they argued that such systems, which had existed in Britain and elsewhere in the past, allowed firms to respond quickly and effectively to sudden and constant changes in demand. The ostensible appeal of 'Flexible Specialization', stemming from its hypothetical potential to assuage the burgeoning unemployment in the manufacturing engineering industries of North America and Western Europe in the 1980s, stimulated others to investigate its historical authenticity. Adopting quasi-comparative methodology, scholars attempted to discover evidence for

170 James R. Womack, Daniel T. Jones, and Daniel Roos, *The Machine That Changed the World* (New York: Macmillan, 1990), pp. 24 – 25; Bryn Jones, *Forcing the Factory of the Future: Cybernation and Societal Institutions* (Cambridge: Cambridge University Press, 1997), pp. 16 – 17; Gilbert, 'The Ames Recessing Machine', p. 207; Aldcroft and Richardson, *British Economy*, p. 178; John Hartley, *FMS at Work* (Kempston: IFS, 1984), p. 7; Boyce and Ville, *Development of Modern Business*, pp. 149 – 150; also David F. Noble, *Forces of Production: A Social History of Industrial Automation* (New York: Alfred A. Knopf, 1984), p. 66; Philip Scranton, 'Diversity in Diversity: Flexible Production and American Industrialization, 1880 - 1930', *Business History Review*, 65 (1991); Scranton, *Endless Novelty*, pp. 3 – 24.

171 For an informed view on hybrid forms of production see, Jonathan Zeitlin, 'Flexibility and Mass Production at War, Aircraft Manufacture in Britain, the United States, and Germany, 1939 – 1945', *Technology and Culture*, 36 (1), 1995, pp. 46 – 49; also Giuseppe Volpato, 'The Automobile Industry in Transition: Product Market Changes and Firm Strategies in the 1970s and 1980s', in Steven Tolliday and Jonathan Zeitlin, eds., *Between Fordism and Flexibility. The Automobile Industry and its Workers* (Oxford and New York: Berg, 1986), p. 193; Boyce and Ville, *Development of Modern Business*, pp. 152, 155; Daniel Friel, 'Institutions and Corporate Strategies for Reorganization: Revising theoretical models on hand from a case study of a German conglomerate in the US and Germany', A paper presented at the *Corporation as a Social Institution Meeting*, May 17-19, 2001; Scranton, *Endless Novelty*; Jonathan Zeitlin, and Gary Herrigel, eds., *Americanization and its Limits. Reworking US Technology and Management in Post-War Europe and Japan* (Oxford: Oxford University Press, 2000); Piore and Sabel, *Second Industrial*; R. Whitley and P. H. Kristensen, eds., *The Changing European Firm - Limits to Convergence* (London and New York: Routledge, 1996); Ronald Philip Dore, *Flexible Rigidities: Industrial Policy and Structural Adjustment in the Japanese Economy, 1970-80* (Stanford: Stanford University Press, 1986); W. Sengenberger, G. W. Loveman, Michael J. Piore, eds., *The Re-emergence of Small Enterprises* (Geneva: ILS, 1990); Womack, Jones, and Roos, *The Machine*.

viable alternatives to the 'Chandlerian' mass producers whose markets were being successfully usurped. Their findings suggested that clusters of small firms, tacitly or formally co-operating, could successfully compete with large-scale corporations. For this relatively small corps of academics, firms that had adopted 'Flexible Specialization' were more efficient, more profitable, and less threatened by macro- and microenvironmental shifts. Especially in markets in which change occurred regularly and rapidly, flexible specialists were purportedly able to prevail over larger, more rigidly equipped, and more formally organized, rivals. Such firms had survived and flourished by selecting manufacturing techniques to suit the markets they served, making the correct choice of machinery of major importance. Thus, while the functioning of the 'market-cum-technological' dynamic may have driven some firms towards mass-production, it had presented others with opportunities to create manufacturing systems more suited to serving their non-mass markets.¹⁷²

In Search of a 'British System'

Other than those implied in contrasting comparisons with the American, German, and Japanese engineering industries, no discernable British equivalent to the 'American system' appears in the historiography in economic and business history. As Lloyd-Jones and Lewis somewhat wryly observed, the 'list of deficiencies familiar to the modern economic historian [has been] rolled out' as historians and scholars offered an accretion of reasons, both technical and non-technical, for the perceived failure of the British engineering industry.¹⁷³ The 'American system', the Great Exhibition of 1851, and the 'ironic' Enfield small arms order featured prominently among Coleman and Macleod's 'mountain of apparently damning evidence' which, they alleged, could be amassed against the leaders of Britain's engineering firms. Spanning an eighty-year period from the mid-nineteenth century to the 1930s, they

172 Piore and Sabel, *Second Industrial*, pp. 1 – 16, 251; also Charles F. Sabel and Jonathan Zeitlin, 'Historical Alternatives to Mass Production: Politics, Markets and Technological Change in Nineteenth-Century Industrialization', *Past and Present*, 108, 1985, pp. 133 – 176; Tolliday and Zeitlin, *Workers*, p. 20; Paul Hirst and Jonathan Zeitlin, 'A Strategy of Flexible Specialization', *Financial Times*, 7 December 1988, p. 26; Sengenberger, Loveman and Piore, *Re-emergence*; Paul Hirst and Jonathan Zeitlin, 'Flexible Specialization versus Post-Fordism: Theory, Evidence and Policy Implications', *Economy and Society*, 18, 1991, pp. 1 – 55; Richard N. Langlois and Paul L. Robertson, *Firms, Markets and Economic Change - A Dynamic Theory of Business Institutions* (London and New York: Routledge, 1995); Whitley and Kristensen *The Changing European Firm*; Vittorio Capecchi, 'In search of flexibility: the Bologna metalworking industry, 1900-1992', in Sabel and Zeitlin, *World of Possibilities*, pp. 1381 – 418; Charles F. Sabel and Jonathan Zeitlin, 'Stories, strategies, structures: rethinking historical alternatives to mass-production', in Sabel and Zeitlin, *World of Possibilities*, pp. 1 – 33; Jonathan Zeitlin, 'Reconciling Automation and Flexibility? Technology and Production in the Post-war British Motor Vehicle Industry', *Enterprise and Society*, 1 (1), 2000, pp. 9 – 62; Richard N. Langlois, Tony Fu-Lai Yu and Paul Robertson, eds., *Alternative Theories of the Firm* (Cheltenham: Edward Elgar, 2002), pp. 332 – 375; Charles F. Sabel and Jonathan Zeitlin, 'Neither Modularity Nor Relational Contracting: Inter-Firm Collaboration in the New Economy', *Enterprise and Society*, 5 (3), 2003, pp. 351 – 385; For an insightful and historically contextual discourse on the advantages and disadvantages of 'general purpose' machinery and 'special purpose equipment' in the passenger car industry, see Rhys, *Motor Industry*, pp. 260 – 301; On 'the market-cum-technological environment' see Wilson, *British Business*, p. 4; on the selection of different manufacturing systems see Boyce and Ville, *Development of Modern Business*, pp. 236, 344 – 345; also Scranton, *Endless Novelty*, pp. 10 – 12.

173 Lloyd-Jones and Lewis, *Alfred Herbert*, p. 19.

drew their – markedly hyperbolised – assumptions from a small number of ‘Reports on various overseas exhibitions and evidence given to sundry committees and commissions’ together with the views of miscellaneous ‘commentators in trade journals’. These, they asserted, confirm that ‘The English engineering employer was damned as more prejudiced against innovation than his foreign rivals’ and that ‘the British businessman ... can be presented as sliding into incompetence, displaying the while an attitude to new techniques which combined ignorance, indifference, hostility, prejudice and complacency in a dosage which ranged from the damaging to the lethal’.¹⁷⁴

Within this sweepingly bifurcated context, British engineers are usually depicted as traditionalists and conservatives who, at least until the end of the nineteenth century, preferred to retain outdated, labour intensive, craft-based systems, reminiscent of the earliest period of the Industrial Revolution. This view is often supported by claims that, although some British engineering firms recognized the superiority of American methods, these were too few in number, their attempts to adopt the ‘American system’ were too late, and their efforts were largely ineffectual.¹⁷⁵ Most British engineering firms, however, are viewed as being ‘prejudiced against innovation’ and because they persisted with their expensive and old-fashioned techniques, they failed to achieve interchangeability, the technical precursor of low-cost mass-production, before the end of the nineteenth century.¹⁷⁶

Needless to say, charges of familial amateurism, classism, nepotism and short-termism, already examined above, regularly intersperse the ‘familiar’ list of shortcomings, with the recent addition of Wilson and Thomson’s critical postulations regarding the training of skilled engineering artisans through the apprenticeship system, one of the British engineering industry’s elemental institutions. Apprenticeships ‘linked being an engineer with the working class’ and ‘was not ... a strong base for skill development’ being ‘at its best ... dependent on the willingness and abilities of the craftsmen who supervised the apprentices, while at its worst, it was only a cheap form of direct labour for employers’.¹⁷⁷

174 Coleman and Macleod, ‘Attitudes’, pp. 588, 592; Mathias, *First Industrial*, p. 388; Sidney Pollard, *Britain’s Prime and Britain’s Decline: the British Economy, 1870 - 1914* (London: Edward Arnold, 1989), p.3; Sidney Pollard, ‘Entrepreneurship, 1870 – 1914’, in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 2, p. 68, 76.

175 Lewchuk, *American Technology*, pp. 1, 66; Alun C. Davies, ‘British Watchmaking and the American system’, *Business History*, 35 (1), 1993, pp. 40 – 55; Saul, ‘American Impact’, pp. 19 – 38; Saul, ‘Motor Industry’, pp. 22 – 24; S. B. Saul, ‘The Machine Tool Industry in Britain to 1914’, *Business History*, 10 (1), 1968, pp. 22 – 43; Saul ‘The Engineering Industry’, in Aldcroft, *Development*, pp. 186 – 237; Edward P. Duggan, ‘Machines, Markets and Labour: The Carriage and Wagon Industry in Late Nineteenth Century Cincinnati’, *Business History Review*, 51, 1977, pp. 308 – 325; Ames and Rosenberg, ‘Enfield Arsenal’; Rosenberg, *American System*, pp. 1 – 86; Mathias, *First Industrial*, p. 375; Habakkuk, *American Technology*, pp. 86 – 87, 105, 168, 170 – 171; Roy Church, ed., *The Dynamics of Victorian Business: Problems and Perspectives to the 1870s* (London: George Allen and Unwin, 1980), pp. 93 – 95; Wilson and Thomson, *The Making of Modern*, p. 77.

176 Coleman and Macleod, ‘Attitudes’, pp. 588 – 611; Aldcroft and Richardson, *British Economy*, p. 151; Rothbarth, ‘Causes’, pp. 383 – 390.

177 Wilson and Thomson, *The Making of Modern*, pp. 157, 160, 162.

In the face of this seemingly irresistible lobby of unfavourable criticism, other than indulging in the largely pointless employment of reciprocal argumentation, it is not surprising that relatively few historians have sought to offer alternatives, let alone refutations. Some, however, have elected to challenge the more tangible aspects of the wide-ranging assumptions of the majority. Musson, for example, has produced illuminating insights into the whole area of the 'American system' allegory, logically and convincingly arguing that 'The conventional view – that mass-production methods did not exist in Britain until introduced from the United States for firearms manufacture in the 1850s – is largely erroneous'. His narrative included references to the many British engineers whose outstanding abilities, he suggested, surpassed 'the early pioneering achievements of Whitney, Simeon North, and others [which] have been exaggerated'.¹⁷⁸ Saul, who generally supported Musson's position, maintained that, before the 1850s, in sectors where the level of demand was appropriate, such as textile machinery, specialization and standardization were regularly applied. Under these conditions, the advantages of interchangeable parts were well understood and appreciated by British engineering firms and mass-production techniques were routinely adopted.¹⁷⁹ Cantrell, in his impeccably researched study of entrepreneurship in the nineteenth-century British engineering industry, also discovered many instances of standardized manufacture and mass-production that predate the 'American system'.¹⁸⁰ Nor, according to Jonathan Zeitlin, were British manufacturing engineering firms reluctant to utilize automation and labour saving equipment. 'By the 1830s and 1840s' he proposed, '[they] were producing textile machinery and locomotives in substantial batches to gauge and template, while advertising their own range of standard gear-wheels, machine tools and other engineering products in printed catalogues'.¹⁸¹

The Manufacture of Internal Combustion Engines

When the complexity of the internal combustion engine is considered, the construction of a machining system for automatically producing its major components presents a considerable challenge. Nevertheless, between 1919 and the start of the Second World War, entrepreneurs and engineers in the passenger car industry steadily applied their efforts in this area. Early experiments in Britain and America centred on a logical progression from the dedicated flow-line system in which machine tools were arranged sequentially according to

178 Musson, 'British Origins', in Mayr and Post, *Yankee Enterprise*, pp. 25 – 48; also A. E. Musson, 'Joseph Whitworth and the Growth of Mass-Production Engineering', *Business History*, 17 (2), 1975, pp. 109 – 149; Musson and Robinson, *Science and Technology*, pp. 473 – 509.

179 Saul, 'Mechanical Engineering Industries', in Supple, *Essays*, pp. 31 – 48; also Saul 'The Engineering Industry', in Aldcroft, *Development*, pp. 186 – 237.

180 Cantrell, *James Nasmyth*, pp. 61 – 93.

181 Zeitlin, 'Between flexibility and mass-production', in Sabel and Zeitlin, *World of Possibilities*, p. 242.

the operations required to produce a single component.¹⁸² In a 'transfer line' a series of special or single-purpose automatic machine tools or 'work stations' were connected by a conveyor system which automatically loaded and unloaded parts, and transferred them between operations. In theory, human intervention was limited to feeding un-machined components in one end, and removing finished ones from the other.¹⁸³

Not an entirely new concept, transfer line technology was based on techniques first used in Britain in about 1807 by Marc Brunel in his rope-block making machinery, and in the American watch-making industry of the 1890s. It proved extremely costly, however, when applied to the manufacture of internal combustion engine parts. According to Zeitlin, the earliest twentieth-century versions were 'overcomplicated', difficult to modify and reset and their electrical systems were especially troublesome; and for these reasons, 'management soon broke them up into a series of individual machines'. Thus considered 'Costly [and] "ahead of its time," [transfer technology] was not widely imitated in the United States'. Nevertheless, improvements slowly progressed until, by the late 1930s, perseverance by Ford of Detroit had led to the development of a more-or-less fully automatic transfer line for the manufacture of engine blocks.¹⁸⁴

During the Second World War, interest in transfer technology in the American automotive industry was stimulated by an exceptionally high demand for internal combustion engines combined with US government funded investment in enhanced manufacturing processes. After 1945, however, the disadvantages began to manifest. Transfer lines were extremely expensive, took many months – often years – to design, build, and install, and their inability to accommodate relatively minor design changes created profound problems for marketing departments. Unsurprisingly, therefore, by the early 1950s, discussions in the technical and trade press relating to transfer technology revolved around efforts to increase their flexibility, enhance their efficiency, and improve their reliability. However, although some progress was made in these areas, the transfer line remained largely confined to the high volume production of standard components.¹⁸⁵ Thus, for firms like Gardner, a form of 'flexible specialization' based on universal machine tools and skilled craftsmen continued to be the most effective system, at least until the 1960s, when the advent of new, electronically-based,

182 For a concise description of the flow line system see, J. T. Black, *The Design of the Factory with a Future* (New York: McGraw Hill, 1991), pp. 36 – 37.

183 'In 1923-25 ... Morris's Coventry engine works developed a set of pioneering multi-station "group" machines for turning out complete cylinder blocks, gearboxes, and flywheels, the latter two also equipped with automatic transfer and clamping devices'. Zeitlin, 'Reconciling', p. 15; 'In England ... in 1923 the British engineer Frank G. Woollard conducted full-scale development of transfer machines for automobile engine blocks, gearbox castings, and flywheels at Morris Engines, Ltd., in Coventry'. David A Hounshell, 'Automation, transfer machinery, and mass-production in the US automobile industry in the post-World War II era', *Enterprise and Society*, 1 (1), 2000, p. 106.

184 Zeitlin, 'Reconciling', p. 15; Hounshell, *American System*, p. 38; Hounshell, 'Automation', pp. 104 – 105, 107.

185 Hounshell, 'Automation', pp. 110 – 113, 128, 137; Boyce and Ville, *Development of Modern Business*, p. 153; Abernathy, *Productivity Dilemma*, pp. 104 - 105, 205.

automation promised a more efficient, and an even more flexible, solution.

VII Summary, Gardner's Disposition in 1955

Given the degree of ambiguity surrounding assumptions of weakness and incompetence in British industrial firms and the doubts raised by historians and scholars concerning both the nature and the existence of decline, it is not surprising that L. Gardner and Sons appears to be largely atypical. In one way, however, it was not. Unquestionably a family firm, there appears to have been a manifest aversion to 'outsiders'. Ownership and control were closely linked, and for most of the twentieth century the chief executive was the oldest surviving family member, a system with possible, but not necessarily probable, negative aspects. Nevertheless, if this quasi-dynastic system can be viewed as a weakness, other regularly asserted flaws are difficult to discover.

If Lawrence Gardner was in any way an 'amateur', it is doubtful whether his ostensibly many customers saw him as such, otherwise his embryonic enterprise would not have flourished as it did. Many industrial firms were set up in the late nineteenth century as small independent ventures, performing services or manufacturing products that were very different to those in which, as more developed enterprises, they came to specialize.¹⁸⁶ Although his small firm continued to offer general engineering services during his lifetime, and did not emerge as a mass-producing 'modern' manufacturing company in the 1880s, it is clear that Lawrence invested in the human capital that secured its future. Presumably with their father's active support, at least two of his sons underwent systematic and advanced training in their chosen profession, illustrating an appreciation of the long-term needs of the developing firm.¹⁸⁷

Undoubtedly professionally qualified and technically proficient, Thomas Harry Gardner appears incongruous when placed among the ranks of uneducated 'rule of thumb' tinkerers that, according to some scholars, exemplified late-nineteenth- and early twentieth-century British engineers. His manifest desire to broaden his knowledge and experience are demonstrated by his pursuit of a career beyond the limits of his father's firm. His entrepreneurial abilities and his solid grasp of the potential of the emerging markets of the second industrial revolution are evidenced in the move from general to specialized engineering, and his awareness of advances in manufacturing engineering technology is demonstrated in the records of machine tool acquisitions between 1898 and 1914. Moreover, in view of the relatively high number of similarly gifted young Mancunians who took advantage of Whitworth scholarships in the late nineteenth century, it seems highly unlikely

186 See for example, Paul Simsa, 'Anlauf in Cannstatt und Mannheim', in *in Aller Welt*, pp. 19 – 21; also, 'The founding years 1873 – 1918', in *A History of Progress* (Ingolstadt: Audi AG, 1992), pp. 7 – 38.

187 Thomas Harry Gardner and Edward Gardner were both Whitworth Scholars, Low, *Whitworth Book*, pp. 160 – 161.

that Thomas Harry was particularly exceptional.¹⁸⁸

The period of growth that began after the establishment of the new Patricroft factory ended only with the approach of conflict with Germany and the obligation to conform to the demands of a nation at war. Thereafter, like many other British manufacturing engineering firms, Gardner's survival depended on its ability to adapt to its macroenvironment and to respond to the needs of its customers. Thus, the 'market-cum-technology' dynamic that shaped its strategy and its structure led to the development of new products as well as the capacity to contend with the imperfections inherent in a largely 'buyers market'.

The production of relatively large numbers of similar engines became feasible only after the developments of the early 1930s and even then, given the diversity of the Gardner product range, it is unlikely that the adoption of full-scale mass-production would have benefited the firm. However, regardless of the opportunities there undoubtedly were for further expansion, the approach of war with Germany once again curtailed its possible implementation. Nevertheless, apart from the brief period examined below, as a family firm Gardner was a profitable concern that provided incomes for up to three thousand employees and for these reasons, it would be unreasonable to describe it as a failure simply because it did not become one of Britain's largest companies.

To suggest that class distinction and snobbery influenced the behaviour of the first or second generation of Gardner's would be mere speculation. Far from retiring to country estates, which may well have been within their financial means, each of Lawrence Gardner's children continued to maintain a direct connection to the family business until illness or death intervened. There can be little doubt that, by the time that the administration of Gardner had passed to the third generation, the shareholding descendants of the founder, including those directly employed in the family firm, expected to receive regular dividends. However, it seems reasonable to assume that such expectations were no different to those of other investors, and there is little evidence to support assumptions that the preservation of family control and the generation of income limited the firm's ability to expand thereafter.

The appointment of Lawrence Gardner's grandson to the post of chief executive in 1955 was dynastic as well as, at least arguably, quasi-nepotistic. The family shareholders probably saw this as an advantage in that he was an 'insider' who they could trust, but their reservations regarding Hugh's abilities are evidenced by the simultaneous appointment of highly qualified non-family directors. Although the seven-man board included two other Gardner family members as well as one other who almost certainly gained his position through family influence, the inclusion of Todd in technology, and Thompstone in legal and trade union affairs indicates that someone, somewhere, appreciated the benefits of balance. What could not have been foreseen, however, was the degree of autocracy that Hugh Gardner was able to exercise. Thus, as the following chapters reveal, the attempt to achieve

188 *Ibid.* and *passim*.

at least a partial separation of ownership from control failed, in that it did not prevent the expertise of the educated 'professionals' being cancelled out by the domineering personality of the unqualified 'amateur'.

CHAPTER 3

MARKETS

I Introduction

I am the largest employer of labour in Eccles: I've got a twelve months order book, and I make a respectable profit. Where am I wrong?¹⁸⁹

The theme propounded in this chapter is that between 1955 and 1960, L. Gardner and Sons irrevocably lost its dominant position as a supplier of proprietary diesel engines to the British HCV industry as a result of entrepreneurial deficiency. Its wider purpose is to examine the changes that took place in the British HCV sector during the late 1950s from the perspective of one of its key constituent firms. The research focused on a relatively brief but pivotally significant period in Gardner's history, concentrating on macroenvironmental shifts that called for microenvironmental adjustments. Essentially an investigation into the circumstances surrounding a change of market leadership, the study analyses internally recorded events derived from primary sources, and the conclusions drawn are supported by externally observable developments and empirical evidence. Particular attention is given to the conduct of the Gardner senior managers, the nature of their responses to developing conditions, and to the effectiveness of their chosen approach.

In 1955, protected by sterling area tariffs, only two other British manufacturers were capable of competing with Gardner in the market for proprietary automotive diesel engines, but because their main business was the supply of complete vehicles, many independent chassis builders regarded them more as competitors than as potential suppliers. The production of British built HCVs had been rising steadily since the end of the Second World War, and Gardner's well-developed relationship with Britain's leading independent HCV specialists placed it in a particularly advantageous position. Thus, at that time, Gardner enjoyed a virtually competition free market, exerting a degree of dominance that led some customers to accuse it of enforcing rigid conditions and imposing quotas. Nevertheless, by 1957, and for the first time since the early 1930s, the firm was facing a severe crisis. The following narrative strongly indicates that the Gardner management failed to respond to a shift in demand, deliberately choosing inaction in the belief that the firm's dominant market position obviated the necessity to respond to its customers' changing requirements.

II Thematic Issues

Other than an occasional brief reference, the advent of a practicable internal combustion engine during the late nineteenth century has received little scholarly attention. Among the new technological developments that fundamentally shaped the future direction of practically every sector of industry in the twentieth century and beyond, accounts of its development in

189 Hugh Gardner's response to criticism, circa 1968, is quoted in, Edge, *Legendary Engineering*, p. 158 – 159.

Britain before 1914 conform, almost exclusively, to the customary themes of backwardness, inefficiency and failure.¹⁹⁰ Moreover, outside its association with motor vehicles after 1918, no scholarly historical works exist which provide definitive accounts of their manufacture in Britain.¹⁹¹ Although road transport has attracted sufficient academic interest to generate a relatively small but noteworthy collection of 'declinist' works, this has focused largely on passenger cars and light commercials.¹⁹² A few of these, however, acknowledge the importance of the HCV sector.¹⁹³

The inadequacy of this sparse body of literature is compounded by the tendency of authors to perceive the history of the British motor vehicle industry after the 1960s as the history of Leyland Motors, whose significant HCV activities are subsumed in ruminative accounts of the problems of its passenger car divisions. However, the two scholarly works by Rhys and, respectively, Bhaskar both cover, to some extent, the HCV industry. They also, as previously mentioned, include sections on the structure of the important motor vehicle components

190 For example: 'Britain's performance may certainly be judged to be unsatisfactory ... in the internal combustion engine'. Lloyd-Jones and Lewis, *Capitalism*, p. 83; also Habakkuk, *American Technology*, pp 202 – 203, 214; Saul 'The Engineering Industry', in Aldcroft, *Development*, pp. 209 – 210, 230; Mathias, *First Industrial*, p. 376; Broadberry and Crafts, 'British Economic Policy', p. 85; Roger Munting, 'Agricultural Engineering and European Exports Before 1914', *Business History*, 27 (2), 1985, p. 137; Chandler, *Scale and Scope*, p. 338; Pollard, *Development*, p. 210; James Foreman-Peck, Sue Bowden, and Alan McKinlay, *The British Motor Industry* (Manchester: Manchester University Press, 1995), p. 93, 137; Geoffrey Jones, 'Global perspectives and British paradoxes', *Business History Review*, 71 (2), 1977; Peter J. S. Dunnett, *The Decline of the British Motor Industry: The Effects of Government Policy, 1945-1979* (London: Croom Helm, 1980), p. 31.

191 '... historians have ... largely ignored the formative years of one of Britain's major industries'. Saul, 'Motor Industry', p. 22; however, Ricardo's autobiography embodies a rare and outstanding primary source, see Ricardo, *Memories*.

192 For example, 'In what was to become one of the most powerful engines of growth in the next generation, the motor car industry ... Britain made a relatively poor showing in comparison with the United States ...' Mathias, *First Industrial*, p. 388; also Hobsbawm, *Industry and Empire*, pp. 174, 178; Wayne Lewchuk, 'The Motor Vehicle Industry', in Elbaum and Lazouck, *Decline of the British Economy*, pp. 133 - 161; Roy Church and Michael Miller, 'The Big Three: Competition, Management, and Marketing in the British Motor Industry, 1922 – 1939' in Supple, *Essays*, pp. 163 – 186; Roy Church, *The Rise and Decline of the British Motor Industry* (Basingstoke: Macmillan, 1994); Martin Adeney, *The Motor Makers, The Turbulent History of Britain's Car Industry* (London: Collins 1988); Roy Church, *Herbert Austin: The British Motor Car Industry to 1941* (London: Europa, 1979); Georgano et al, *Motor Industry*; Lewchuk, *American Technology*; George Maxcy and Aubrey Silberston, *The Motor Industry* (London: Allen and Unwin, 1959); Stephen Wilks, *Industrial Policy and the Motor Industry*, Second Edition (Manchester: Manchester University Press, 1988). Millward, 'Industrial and Commercial', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 141 – 144; Sue Bowden, James Foreman-Peck and Tom Richardson, 'The Post-War Productivity Failure: Insights from Oxford (Cowley)', *Business History*, 43 (3), 2001, pp. 54 – 78; Timothy R. Whistler, *The British Motor Industry, 1945 – 1994: A Case Study in Industrial Decline* (Oxford: Oxford University Press, 2001).

193 '... the production and market characteristics in the heavy commercial vehicle sector contrasted markedly with the mass produced car sector'. Church, *Rise and Decline*, p. 91; HCVs '... accounted for one-tenth of the total number of commercial vehicles produced, but much more than one-tenth of the value of commercial vehicle production'. Cairncross, *British Economy*, Second Edition, p. 106; Pollard, *Wasting*, p. 82; Zeitlin, 'Reconciling automation', pp. 9 – 62; a concise and rare discussion on the pre-1939 HCV developments in Britain appears in H. G. Castle, *Britain's Motor Industry* (London: Clerke and Cockeran, 1950), pp. 197 – 209.

sector, and both mention Gardner in the context of a notable supplier of proprietary diesel engines.¹⁹⁴

Unsurprisingly, given the paucity of scholarly literature on the British HCV industry, sources concerning the nature and structure of its markets are equally lacking. Moreover, beyond elaborately reasoned discourses on what Chandler really meant when he proposed that 'the visible hand of management replaced Adam Smith's invisible hand of market forces' few scholars attempt to analyse markets. Those who do often fail to discriminate between markets, marketing, advertising, and selling, and although some historians concur with the specialists, it is clear that most are uncertain about the difference between consumer markets and industrial markets.¹⁹⁵

Rarely purchased by individual consumers, diesel engines are mainly sold to industrial firms that are usually themselves suppliers of equipment to other firms and organizations such as builders, haulage contractors, passenger transport concerns, government departments and municipal institutions. Designated variously as 'capital', 'business', 'producer', or 'industrial', such markets clearly have 'certain characteristics that contrast sharply with consumer markets'. Demand is relatively inelastic and prone to fluctuations, and buyers are fewer, larger and more geographically concentrated. In general, therefore, although it may be possible to influence the end user's selection of equipment that incorporate a particular brand, the demand for diesel engines is derived from the demand for other capital goods. In Gardner's case, the most important marketing consideration was the necessity to convince end users, who were actually their customer's customers, to specify Gardner engines, and to be constantly aware of their needs as well as their wants.¹⁹⁶

According to Rhys and Bhaskar, the constituent firms of the British HCV industry sector enjoyed a steadily growing market during the 1950s, their prosperity being based on a strong demand for highly individualized vehicles which called for custom-built products that the high volume producers were unable to satisfy. Although some HCVs, particularly buses, were occasionally ordered in numbers that afforded the manufacturer a certain level of standardization, the quantities involved were rarely conducive to the employment of mass-

194 Rhys, *Motor Industry*, pp. 79 – 119, 341 – 357; Bhaskar, *The Future*, pp. 239 – 312.

195 Chandler, *Visible Hand*, p. 1; The confusion of marketing and selling is particularly exemplified in Geoffrey Tweedale, 'Marketing in the second industrial revolution: a case study of the Ferranti Computer Group, 1949-63', *Business History*, 34 (1), 1992, pp. 96 – 128; also vividly illustrated by Aldcroft and Richardson's spectacularly sweeping assertion that 'Americans and ... Germans were more willing to purchase large quantities of standardized and relatively cheap goods ...', made even less cogent by their short and equally over-generalized discussion, on '... the way in which market forces affect the pattern of technical progress'. Aldcroft and Richardson, *British Economy*, pp. 159, 184 – 186; also in the somewhat jargonized chapter on marketing, devoid of any authentic appraisal of capital goods markets, in Boyce and Ville, *Development of Modern Business*, pp 175 – 226; Mathias, however, at least recognized that 'The capital goods industries have special problems'. Mathias, *First Industrial*, p. 110; for a succinct overview of different types of markets and their unique characteristics see Kotler, *Marketing Management*, p. 185.

196 Kotler, *Marketing Management*, p. 185.

production methods. More typically in this market sector, the HCV specialists concentrated on designing and building vehicle chassis in accordance with their customers' specification. These were usually bus service operators or a heavy haulage contractors who also selected major components such as the engine, the rear axle, and the gearbox. Once finished, chassis were delivered to another specialist firm where they were fitted with a body and painted in accordance with the end user's requirements. Especially in conditions of fluctuating demand which tended to prevail in the post-war capital goods sector, this type of market structure was prone to fragmentation and imperfections.¹⁹⁷

III Macroenvironmental Background

Throughout most of the second half of the twentieth century, the actions of successive governments impacted greatly on British industry. Between 1955 and 1964, a series of induced economic cycles, designed to dampen down demand in order to contain inflation or to stimulate demand in order to advance economic growth, are seen as being especially detrimental. Often referred to as 'stop-go', these sequences, according to Pollard, produced a 'ratchet effect' that progressively increased British dependence on imports. While some scholars have suggested that these cycles merely served to expose inherent weaknesses in the British economy, such as 'institutional constraints' that manifested in resistance to adopt new methods and advanced technology in the manufacturing engineering industries, for others, including Lloyd-Jones and Lewis, they gave 'inconsistent signs to entrepreneurial decision makers'.¹⁹⁸

The first recession of this period occurred during 1956 and 1958 as a result of government action taken in response to public anxiety over the balance of payments and inflation. Reinforcing earlier deflationary measures, the budget of September 1957 increased the bank rate to seven per cent - hitherto the highest post-war level – and cut public spending. As a result, economic activity decreased significantly and unemployment began to rise, continuing to do so throughout 1958. To counter these politically undesirable developments, the bank rate was gradually reduced to four per cent and, in September 1958, credit restrictions were eased. In April 1959, an expansionary pre-election budget established a boom phase with cuts in taxation and a resurgence of public spending, causing industrial output to rise by more than six per cent and, in consequence, a fall in unemployment. By 1960, however, the slowing pace of industrial production, combined with rapidly worsening balance of payments figures, signalled an impending slump.¹⁹⁹

197 Rhys, *Motor Industry*, pp. 79 – 119, 341 – 357; Bhaskar, *The Future*, pp. 239 – 312; Morgan, *Economics*, pp. 61, 173 – 179, 239.

198 '... stop-go' policy' impacted greatly on the UK motor vehicle industry, particularly after 1953'. Pollard, *Development*, p. 305; on 'stop-go' during this period also Cairncross, *British Economy*, pp. 95 – 99, 118; Dunnett, *Decline*, p. 61; Lloyd-Jones and Lewis, *Capitalism*, p.182.

199 Sir Alexander Cairncross, 'Economic Policy and Performance, 1945 – 1964', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 56 – 61; Feinstein, 'Success and Failure', in Floud and McCloskey, *Economic History of Britain*, Second Edition,

IV Microenvironmental Background

By 1955, although direct government control of Britain's post-war transport infrastructure was largely confined to the railways, the road transport industry, and thereby the characteristics of motor vehicles, continued to be influenced through legislation. In particular, a series of amendments to the Ministry of Transport's Motor Vehicles (Construction and Use) Regulations enacted between 1955 and 1957, increased the maximum permitted weight of heavy trucks and the maximum permitted length of double-deck buses, and raised the erstwhile highly restrictive maximum speed limits for all HCVs. Together with improvements to existing roads and the construction of new ones, these changes stimulated a need for larger, faster, and more efficient vehicles. Between 1956 and 1960, in terms of billion tons per kilometre, the amount of freight carried on Britain's roads almost doubled, while that carried by rail fell by more than ten per cent during the same period. (see Appendix 2, tables 1 and 2) As a result, the number of HGVs produced in Britain increased by 267%, and at the same time bus production increased by 221%. (see Appendix 2, tables 3 and 4) While it should be stressed that not all of these vehicles were large enough to require engines in Gardner's power range, the figures reflect the level of growth in the market for engines for trucks and buses.²⁰⁰

By the mid-1950s, the cluster of firms that specialized in the production of HCVs had begun a process of ultimately internecine consolidation.²⁰¹ In 1948, AEC purchased Crossley Motors of Manchester, a company with a similarly advantageous market position as a supplier of buses in the North West of England, and in the following year, they acquired Maudslay Motor Co. of Coventry, another producer of buses and commercial vehicles. By 1951, the business and manufacturing activities of both of these companies had been closed down and their names had disappeared; developments that strongly suggest that the motivation behind these takeovers had more to do with the eradication of competition than with streamlining and improved efficiency. The scope of AEC's ambitions is also evidenced by the installation of a new 'Detroit-style' automatic machining facility for the production of diesel engine components in 1955. The adoption of this highly productive but, as previously discussed, extremely inflexible technology suggests aspirations to supply proprietary diesel

Vol. 3, pp. 104, 116; Jim Tomlinson, 'British Economic Policy Since 1945', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 260, 267, 269, 278, 283; Barry Supple, 'British Economic Decline Since 1945' in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 338.

200 Barker and Savage, *Transport in Britain*, pp. 211 – 212, 226 – 229; French, 'Public Policy and British Commercial', p. 37; *Statutory Instrument No. 2101, Motor Vehicles (Construction and Use) Regulations* (London: HMSO, 1951); *Statutory Instrument No. 1453, Motor Vehicles (Construction and Use) Regulations* (London: HMSO, 1952); *Statutory Instrument No. 482, Motor Vehicles (Construction and Use) Regulations* (London: HMSO, 1955); *Motor Vehicles (Variation of Speed Limit), 1955*; *Motor Vehicles (Variation of Speed Limit) Regulations* (London: HMSO, 1955).

201 Foreman-Peck, Bowden, and McKinlay, *Motor Industry*, pp. 106 - 109; Church, *Rise and Decline*, p. 76.

engines as well as complete vehicles.²⁰²

In 1951, Leyland Motors began a series of mergers and take-overs with the acquisition of Albion Motors, Scotland's only commercial vehicle producer, and in 1955, they purchased Scammell Lorries of Watford, an important Gardner customer that, notwithstanding the takeover, continued to offer Gardner engines for many years. Unlike AEC, Leyland consolidated, or at least assimilated, the activities of both of these firms, maintaining some of their manufacturing activities and astutely preserving both well-known marques. By then Leyland, which employed approximately 14,000 personnel producing over 8,000 chassis a year, 60 per cent of which were exported, was easily Britain's largest HCV producer.²⁰³

By 1955, what little post-war competition that had existed in the supply of proprietary diesel engines to the HCV sector had disappeared. A relative latecomer to the industry, Perkins of Peterborough was founded in 1932 specifically to develop and manufacture lightweight, high-speed diesel engines, and its success in that area of the automotive market is evidenced by its growth. By 1948, in terms of unit production, Perkins had outstripped Gardner, and by 1950, with around 4,000 personnel producing over 15,000 engines a year, it had become Britain's largest manufacturer of automotive diesels. In 1953, Perkins had made an abortive attempt to enter the HCV market in direct competition with Gardner. However, its R6 unit soon earned a reputation for unreliability and high maintenance costs, resulting in substantial warranty claims that plunged the firm into a deep financial crisis that ultimately cost it its independence.²⁰⁴

Although not yet fully engaged with the British automotive industry, by 1955 the Cummins Engine Company of Columbus, Indiana, USA, had been drawn into establishing a diesel engine manufacturing plant in Britain. This came about as an indirect result of exchange controls introduced to support sterling, which had effectively excluded the Euclid Road Machinery Company of Cleveland, Ohio, USA, a manufacturer of heavy strip mining equipment and one of Cummins' important American customers, from its lucrative Canadian markets. In 1951, reluctant to forego this important source of revenue, Euclid established a manufacturing plant near Glasgow, thus regaining access to Canada. Still, however, prohibited by British import controls from fitting the Cummins engines they normally supplied, Euclid was obliged instead to install British made Rolls-Royce diesels. Shortly thereafter, and with the assistance of the British government and Scottish regional agencies, the Cummins management decided to emulate Euclid, establishing a production facility at Shotts that soon

202 Stevens-Stratten, *AEC*, pp. 19, 43 and *passim*; 'Machining Engine Castings', *The Engineer*, 25 November 1955, p. 771.

203 Leyland, *Official History*, pp. 1 - 10, 22 - 26 and *passim*; Kennett, *Leyland*, p. 56.

204 'The 1950s: Perkins as a Public Company', in Parisson et al, *Perkins*; Alec Osborn, 'Tales of an Engine Designer', George Stephenson Lecture, Institute of Mechanical Engineers, 2006.

became a truly formidable Gardner competitor.²⁰⁵

V Findings

1956 was an all-time record year for Gardner, both in terms of the number of engines delivered and the number of orders received from the firm's important automotive industry customers. As a result, the Patricroft plant was operating at maximum capacity, and delivery schedules were becoming increasingly extended. Finding it difficult to recruit much needed additional skilled personnel, the management approached the Works Committee (see pp. 88 – 89 below) for permission to assign dilutees to several vacant positions that were proving particularly hard to fill. This request received an unenthusiastic response from members of the AEU District Committee who were concerned about the prevailing high level of unemployment among skilled machinists in the Manchester area, but their decision to deny Gardner permission to dilute was tempered with an undertaking to direct unemployed union members to present themselves at the Patricroft plant.²⁰⁶ Soon, however, concerns about staffing levels were overshadowed by more serious problems.

By January 1957, it had become clear that the workload had eased considerably and rumours were circulating throughout the plant that a dearth of orders would soon lead to short-time working. Union representatives, who felt constrained to approach the management in order to clarify the situation, were informed that the problems were being caused by the on-going shortage of skilled machinists and could therefore be solved if the AEU would agree to dilution. Accepting this explanation, the shop stewards wrote to the District Committee on behalf of the firm, urging them to reconsider. They in turn referred the appeal to the National Executive who, in April, gave their consent. By October, however, the management had completely altered its position. Acknowledging that the firm was indeed suffering adverse trading conditions, they offered the workforce a choice between redundancies and short-time working. The Works Committee reluctantly elected to accept the latter and, in November, the plant was put on a four-day a week.²⁰⁷

During 1958, when HCV production in Great Britain increased significantly, engine output at Patricroft fell by thirty-six per cent, and orders received for automotive engines fell by thirty-eight per cent, making it Gardner's worst year since 1936. Long-standing customers including Daimler, Scammell, Guy, Foden, ERF, and Atkinson all purchased significantly

205 Cruikshank and Sicilia, *Cummins*, pp. 78, 156, 185, 187; 'Euclid Road Machinery Co.', *The Engineer*, 4 February 1955, p. 142.

206 Dilution was 'the use of semi-skilled and unskilled labour in skilled jobs' Garside, 'Management and Men', in *Supple, Essays*, pp. 244 – 267; also Zeitlin, 'Flexibility and Mass Production', pp. 46 – 49; Pollard, *Development*, p. 32; James B. Jefferys, *The Story of the Engineers, 1800 – 1945* (London: Lawrence and Wishart, 1945), pp. 174 – 176; Report of the District 11 Organizer, *The AEU Monthly Journal*, August 1956, p. 251; Shop Stewards' Minutes, 15 October 1956; Edge, *Legendary Engineering*, pp. 133, 205 – 206.

207 Shop Stewards' Minutes, 23 January 1957; Shop Stewards' Minutes, 17 April 1957; Shop Stewards' Minutes, 30 October 1957; Report of the District 11 Organizer, *The AEU Monthly Journal*, October 1956, p. 315; Shop Stewards' Minutes, 13 November 1957; Shop Stewards' Minutes, 11 June 1958.

reduced numbers of Gardner engines. Only the level of orders placed by the bus builder Bristol Commercial Vehicles remained steady and non-automotive business appears to have held up reasonably well. (see Appendix 3, tables 3 and 4)

Exactly when the Gardner management came to terms with the prospect that the firm's difficulties stemmed from a weakness in the product range is not known, but it is clear that when the nature of the problem was finally perceived, it moved quickly to provide a solution. Although the 6LX was not an entirely new design – in reality it was an enlarged version of an existing engine – it offered Gardner's customers the extra power they were clearly demanding. The first production batch of twenty-five passed through the works in February 1958. By mid-April, after a very brief period of prototype proving, the first unit had been tested and the new engines went on offer to the market almost immediately. With the introduction of the 6LX, the situation gradually began to ease, although sales to automotive customers continued to fall until mid-1958. By August the order position was reported to be 'somewhat improved', by November, it had become 'satisfactory', and as the new engine went into full production, the level of orders received continued to recover.²⁰⁸

In April 1959, the management reported that the current satisfactory level of business was being maintained. However, because short-time working had led many employees to seek full-time work elsewhere, as the workload increased, staff shortages caused production delays and bottlenecks in several departments. Nevertheless, conditions gradually improved thereafter, but it would be nine years before output volumes recovered to the five thousand a year level that had been reached in 1956 and for two or three years, between 1957 and 1959, the company was almost certainly trading at a net loss.²⁰⁹ Moreover, when measured as a percentage of total UK unit production of HCVs, Gardner irretrievably lost approximately half its market share. (see Appendix 2, tables 5, 7, 8, and 9)

VI Analysis

Although Gardner's poor performance coincides with the economic downturn of 1958, the research indicates that the recession in the general economy was not reflected in the market for trucks and buses. Moreover, the evidence presented above indicates clearly that Gardner lost its leadership of the British market for proprietary diesel engines for HCVs because it failed to respond to a shift in demand. The speed with which the firm was able to introduce a larger engine once the seriousness of the situation had been appreciated shows that the inertia did not result from constraints imposed by rigidities inherent in the disposition of the firm's employees or in the nature of its manufacturing plant. Logically, therefore, there can only be three bases for the Gardner managers' inaction: either they simply did not know

208 Edge, *Legendary Engineering*, pp. 144, 203.

209 Shop Stewards' Minutes, 23 July 1958; Shop Stewards' Minutes, 28 October 1958; Shop Stewards' Minutes, 7 January 1959; Shop Stewards' Minutes, 4 February 1959; Shop Stewards' Minutes, 4 March 1959; Shop Stewards' Minutes, 18 March 1959; Shop Stewards' Minutes, 1 April 1959.

about the impending increases in the maximum permitted vehicle sizes and speeds; or they knew about them but did not appreciate that they would lead to a demand for more powerful engines; or they believed that Gardner's customers would continue to purchase the firm's existing but, by then, underpowered units. Any of these conditions would constitute a failure by the Gardner senior managers to safeguard of the long-term health of the company: their primary entrepreneurial responsibility.

It seems reasonable to assume that other firms had recognized that observable improvements to Britain's network of roads and the clearly signalled and well-publicized increases in the permitted speeds and sizes of trucks and buses would lead to a shift in demand.²¹⁰ During the early 1950s, as well as Perkins' abortive attempt, Britain's two largest HCV builders, AEC and Leyland, both extended and updated their manufacturing facilities in order to produce larger automotive diesel engines.²¹¹ More significant, however, were developments taking place at the newly commissioned Cummins engine plant at Shotts, near Glasgow.²¹² Primarily set up to produce much larger diesels for off-road applications, by mid-1957 the demand from British vehicle operators for more powerful HCV engines had stimulated a change to their original business plan. The first British built Cummins truck engines were assembled from kits of components airfreighted in from the firm's American headquarters, but within two years increasing demand led to 100% British manufacture.²¹³

In 1957, the largest automotive engine in the Gardner range was the 112 bhp 6LW, originally designed during the administration of Thomas Harry Gardner in the early 1930s. By comparison, AEC's 159 bhp AV590 and 192 bhp AV690, and Leyland's 154 bhp O.680 were all considerably larger, and the Glasgow built Cummins range, designed for the North American market, had ample power.²¹⁴ Clearly, therefore, if vehicle operators placing orders for the heavier and faster vehicles allowed by the new legislation considered the Gardner

210 For example, 'Between 1944 and 1952 (HCV) manufacturers lobbied persistently for increases in the size of domestic lorries and buses on the grounds of reducing the range of models and promoting economies of scale'. French, 'Public Policy and British Commercial', p. 37; Changes in Construction and Use Regulations, as detailed in various Acts and Orders, were readily obtainable from HM Stationery Office. They were also rendered more clearly understandable in the series Leslie Deans Kitchin, *Kitchin's Road Transport Law, A Summary of the Legislation Affecting the Construction, Equipment and Use of Motor Vehicles*, first published by Iliffe in 1944 and regularly, usually annually, updated thereafter.

211 AEC's 159 bhp AV590 and the 192 bhp AV690 were both produced on advanced manufacturing facilities commissioned in 1955. 'Machining Engine Castings', *The Engineer*, 25 November 1955, p. 771; Stevens-Stratten, *AEC*, p. 57; Leyland's extended manufacturing facilities, recently acquired from the Ministry of Supply, were capable of turning out more powerful engines, including the 154 bhp O.680, originally introduced in 1951. Leyland, *Official History*, pp. 24, 28; Kennett, *Leyland*, p. 87.

212 Gardner was probably aware of Cummins' plans to manufacture diesel engines in Britain, see Cruikshank and Sicilia, *Cummins*, p. 81; also Edge, *Legendary Engineering*, pp. 162 – 164.

213 Cruikshank and Sicilia, *Cummins*, p. 190.

214 'Buy then [the late 1950s] the motorways picked up, and trucking in Britain moved into our horsepower range, and the higher weight laws came into effect, and Shotts became a profitable outfit'. J. Irwin Miller, quoted in Cruikshank and Sicilia, *Cummins*, p. 190; also Rhys, *Motor Industry*, p. 93.

product to be underpowered, there was no shortage of alternative suppliers for them to turn to. That they did so is evidenced by the sharp fall in Gardner's sales as long-standing customers began to order competitor's engines, and by the steady improvement that followed the hasty introduction of the more powerful 6LX in 1958.²¹⁵

The contention that Gardner lost its market leadership because it did not respond to a change in demand is supported by the concurrent increases in the permitted maximum sizes and weights of HCVs, as well as the developments at AEC, Cummins, Leyland, and Perkins. The key issue, therefore, is to discover reasons why Gardner's position was successfully challenged by a newcomer, whose 'powerful, but thirsty' engines were virtually unknown in Britain.²¹⁶ Fundamentally, it is inconceivable that Gardner simply missed 'a turn in the road'.²¹⁷ Even if their own vigilance was lacking, Gardner's customers, as well as their customers, could not possibly have failed to recognize the implications of the impending changes and communicated their requirements accordingly. The only plausible explanation is that Gardner believed, naively, that the market would continue to accept their existing reliable, economical, but decidedly underpowered units and for this Hugh Gardner, as chief executive officer, must bear responsibility.

As Manfred F. R. Kets de Vries and Danny Miller's examination of what they describe as 'common dysfunctional managerial styles' appears to demonstrate, the 'psychological orientations of managers' may remarkably and dramatically influence a range of factors concerning a firm's performance. In particular, they proposed that the 'personality' of the CEO has an important bearing on a firm's organizational culture, and is of considerable importance in the formulation of business strategies.²¹⁸ Thus, in seeking reasons for Gardner's lack of preparedness for easily foreseeable market change, an examination of the personality of its chief executive may reveal much.

To begin with, while his appointment to the post of CEO on the death of his father in 1955 was more-or-less inevitable, other than his birthright and a lengthy 'apprenticeship' in the family firm, Hugh had few discernible qualifications to offer. Certainly, given his relatively privileged background, his education and academic achievements were at best average. After attending a private primary school in Cheshire, he spent the four years between 1916 and 1920 at the Manchester Grammar School.²¹⁹ In January 1921, at the age of seventeen,

215 'Machining Engine Castings', *The Engineer*, 25 November 1955, p. 771; Stevens-Stratten, *AEC*, p. 57; Leyland, *Official History*, pp. 24 – 25; Kennett, *Leyland*, p. 87; Although Gardner did make a 150 bhp eight-cylinder in-line unit at that time, its sheer size and weight made it unsuitable for most trucks and buses. Edge, *Legendary Engineering*, pp. 138 – 139, 205 – 206.

216 Cruikshank and Sicilia, *Cummins*, p. 190.

217 See Kotler, *Marketing Management*, p. 386.

218 Manfred F. R. Kets de Vries and Danny Miller, *The Neurotic Organization*, (San Francisco: Jossey-Bass, 1984), pp. 2, 18.

219 Manchester Grammar School, *A Biographical Register of Old Mancunians 1888 – 1951* (Manchester: Manchester Grammar School, 1965).

he took his place on the shopfloor of the Patricroft works, purportedly studying part time at Salford Technical College, but if he sat any examinations, either academic or vocational, during these years, no records exist and no detectable accolades were conferred.²²⁰

In fact, rather than the pursuit of knowledge and the attainment of professional qualifications, he appears to have spent his youth indulging an ostensible passion for fast cars and motorcycles. In this, he was a winner, or at least he usually came first, which is not necessarily the same thing. During the 1920s, together with his younger brother John, he competed frequently in motorcycle races regularly held on the sands at Southport, specializing in the fifty-mile events that seem to have been more like endurance tests. Given the obvious advantages of the support of a large team of highly skilled engine fitters, it is not surprising that the Gardners frequently led the field, the usual result being Hugh first and John second. Only on one occasion, and that was when Hugh's machine had broken down, did John succeed in winning, suggesting that sibling rivalries had been resolved at some earlier stage in their relationship.²²¹ Moreover, a few years later, when the Gardner brothers turned their attention to sports cars, a more comfortable activity that held Hugh's interest until he was well into his seventies, he again assumed the leading role, while John literally took a back seat.²²²

Hugh Gardner's assertive disposition was not only demonstrated on the sports field, and nor were his exigencies confined to his immediate relatives. Although he was not the only grandson of the founder to have shown an interest in the role, it is clear that at some stage he assumed control of the design department; a position that he seems to have regarded as his birthright and one that he was evidently prepared to aggressively defend. In the late 1930s, and without Hugh's knowledge, some 'junior Gardner family members' – perhaps Ernest's sons Thomas Joseph and Ernest Edward – designed and built a new small diesel engine. Upon hearing of this Hugh became infuriated, literally walking out of the factory and refusing to return until the engine was dismantled and his authority reaffirmed.²²³ Not the last time that Hugh Gardner adopted a blustering strategy in order to impose his will, his intractability later deprived the firm of potentially beneficial developments.

On at least three other recorded occasions, Hugh Gardner exhibited obdurate inflexibility, entrepreneurial deficiency, and technical incompetence. For example, he emphatically refused to allow Gardner engines to incorporate turbo-charger technology, even though this was, certainly by the mid-1950s, a well-established and thoroughly proven method of boosting engine power. In 1974, he vetoed a proposition presented to the board by Paul

220 Glynn, 'Mr. Hughie'.

221 *The Southport Visiter*, various editions, August 1925 – August 1928; John Gardner's first and only recorded win took place in September 1927, *ibid.*; Glynn, 'Mr. Hughie'; Glynn, 'First Link'.

222 'On 5 February 1932, with Hugh Gardner at the wheel, John Gardner in the back ... they drove [the diesel powered Bentley] to Kirkstone Pass in the Lake District, and back, a distance of 171 miles'. Whitehead, *Gardners*, p. 31.

223 Edge, *Legendary Engineering*, p. 178.

Gardner, Hugh's nephew and a director. This bold and imaginative suggestion, which Hugh refused even to discuss, involved the acquisition by Gardner of the Rolls-Royce diesel engine plant at Shrewsbury, which was at that time in the hands of official receivers. Hugh's strategy for dealing with both of these challenges to his authority was to threaten to resign unless the shareholders accepted his position. On another occasion, and against the advice of his fellow directors, he vigorously resisted the incorporation of a fully proven proprietary pump-seal in Gardner engines, insisting instead that the firm persevere with his own expensive and faulty design. This time, however, stimulated by substantial and increasing warranty costs, common sense eventually prevailed.²²⁴

According to more than one of his co-directors, Hugh Gardner 'could not and would not delegate', and after 1955, he rapidly imposed his own inflexible style of management on the family firm. Intolerant of dissent, board meetings were little more than orchestrated implementations of Hugh's predetermined policies, and anyone having the temerity to question his judgement received a curt rebuttal. He also brought every important aspect of the firm's business under his direct control. Together with his brother John, he soon took personal charge of communications with the firm's most important customers, as well as responsibility for the major portion of domestic sales. Only exports and non-automotive markets were left to Norris Henty and Gardners, whose London headquarters was subsequently relegated to branch office status.²²⁵

Thereafter, very little in the way of strategic market planning took place. Other than their attendance at annual commercial vehicle shows, advertising, both above- and below-the-line, virtually ceased and the gathering of market information, conventionally the responsibility of either the marketing or the sales departments, was largely neglected. Gardner also began to withdraw from some its traditionally successful non-automotive markets, and to downgrade its once extensive overseas presence. In key export territories, including Southern Africa and the Antipodes, directly employed factory representatives were dismissed and replaced with local commission agents.²²⁶

224 On the advantages of turbo-charged diesel engines see Cruikshank and Sicilia, *Cummins*, pp. 145 – 146, 189, 307 – 310; Shop Stewards' Minutes, 10 March 1976; Paul Gardner, Manchester to M. Halton, Horwich 13 August 2003.

225 'While it would not be entirely accurate to say that Hugh Gardner ran the company 'single-handedly' his management style was rather autocratic ...' Edge, *Legendary Engineering*, pp. 133, 136 – 137, 154 – 156, 160, 508; D. G. Houghton, Chichester to M. J. Halton, Horwich, 8 September 2003; D. G. Houghton, Chichester to M. J. Halton, Horwich, 24 October 2003; Paul Gardner, Manchester to M. J. Halton, Horwich 13 August 2003.

226 See 'Patricroft Engines for S. America', *Eccles and Patricroft Journal*, 30 August 1929, p. 5; In the late 1940s, Gardner's established network of overseas representatives and agents included factory representatives in Australia, Canada, Hong Kong, India and South Africa. In Europe, the firm had agents in Belgium, Denmark, France and the Netherlands; in the Americas, other than Canada, they were represented only in Argentina. Gardner product catalogue circa 1950, Salford Local History Library Archive, ref. L620 GAR (paper); 'Engines At The National Boat Show', *The Engineer*, 28 January 1955, p.140; 'Engineering, Marine and Welding Exhibition', *The Engineer*, 23 September 1955, p. 433; Whitehead, *Gardners*, p. 38.

While it would be extremely unrealistic to claim that the foregoing assortment of largely anecdotal accounts and incidents represent anything approaching a comprehensive analysis of Hugh Gardner's character, together they amount to a reasonably persuasive measure of inference. Moreover, their implication that Hugh's conduct manifested a passionate preoccupation with control appears to resonate with aspects of what Kets de Vries and Miller depicted as a typical 'Compulsive Organization'. In particular, such firms show signs of a 'constant preoccupation with domination and submission' as well as with 'detail and established procedures.' Such organizations 'place great emphasis on product quality' and they also 'focus on a carefully circumscribed target market', tendencies that can obscure the relevance of impending macroenvironmental change. Because 'Compulsive Organizations' usually dominate their chosen markets they are, 'at least for a while', able to ignore market change, but if their strategies are too narrowly focused, their survival in a changing environment becomes increasingly difficult.²²⁷

Summarizing the weight of the evidence presented above, it seems unreasonable to assume that Gardner's inaction was the result of ignorance or misunderstanding, and it is equally implausible to imagine that a Board of Directors that included experienced professionals would not have drawn some conclusions from the information available. If, however, their collective astuteness had been negated by the autocratic manner with which Hugh Gardner handled the firm, then the only reasonable explanation is that he alone was responsible for this blunder. The resulting crisis gave rise to serious consequences, the most important of which was the exposure of Gardner to new competition, an opportunity that Cummins quickly grasped and upon which they steadily built.

A less immediate outcome, but one at least as critical for the future of Gardner, was the long-term effect on the firm's relationship with its employees. The managers had clearly misrepresented the situation in early 1957, when they must have been aware of the true position. Moreover, they had used the situation to inveigle the shop stewards, the full-time officials on the AEU District Committee, as well as the union's headquarters staff into accepting dilution when this would in no way alleviate the firm's difficulties. In the next chapter, which concentrates on workplace industrial relations at Gardner, the worsening relationship between the firm and its employees during a period often viewed as one of the most turbulent eras in Britain's post-war history are described and analysed.

227 Kets de Vries and Miller, *Neurotic Organization*, pp. 28 – 31.

CHAPTER 4

WORKPLACE INDUSTRIAL RELATIONS

I Introduction

What's important is the approach you take. I've seen some people go into negotiations with the idea that they're not going to change their position, and that's that. But eventually you've got to come together, so you have to put yourself in a position where you can come together. Unless, of course, you want to have a strike. You can always have a strike if you want a strike.²²⁸

The theme propounded in this chapter is that between 1960 and 1975, the managers of L. Gardner and Sons espoused workplace industrial relations policies that increasingly made the relationship between the firm and its employees dysfunctional. Its wider purpose is to examine the nature of workplace industrial relations in Britain during the 1960s and 1970s from the perspective of a middling-sized industrial firm. The research focused on a fifteen-year period widely regarded as an era during which Britain's industrial relations became progressively impaired, and Britain's decline as an industrial power became irreversible. The analysis concentrates on the relationship between the Gardner management, the employees' elected representatives, and the local full-time trade union officials. Particular attention was given to the changing perspectives of these three key elements as each in turn vied for control in the workplace, and the aggregate effects of procedures, regulations, and payment systems.

Between 1960 and 1973, the majority of trade union members at Gardner supported relatively moderate shop stewards and demonstrated their aversion to discord by their rejection, on more than one occasion, of the more assertive strategies of full-time union officials. However, while these conditions afforded opportunities for reasonably astute managers to foster stable workplace industrial relations, it is clear that the relationship between the firm and its employees gradually worsened during the 1960s, deteriorated steadily after 1968, and broke down completely in 1973. It will be argued that the firm's problems in this area stemmed not from mounting trade union power, workers' intransigence, or management's lack of authority, but from unrealistically high expectations of submission to management control coupled with a manifestly maladroit approach to negotiating procedures. The following narrative describes the deterioration of workplace industrial relations at Gardner, analyses the findings, and offers explanations for these developments.

II Thematic Issues

The evolving relationship between employers and employees is an area of interest that has increasingly attracted the attention of academics, chroniclers, journalists, and general

228 Dick Stoner, executive vice president, Cummins Engine Company, quoted in, Cruikshank and Sicilia, Cummins, p. 268.

commentators since the late Victorian era.²²⁹ Viewed from a diversity of standpoints and typically studied using an institutional approach, the resulting vast body of scholarly works range from descriptive histories of trade unionism and of individual trade unions, to more broadly structured narratives on the socioeconomic, sociopolitical, and sociocultural influence of workers and their organizations.²³⁰ Its growing significance, especially since the mid-twentieth century, has led to the establishment of degree courses at British universities and abroad, and its maturity as a discrete field of study to the founding of several specialist scholarly journals.²³¹ Evidenced by a gradual but discernible philosophical transformation among industrial relations managers – from regarding employees as anonymous factors of production to a more unitarist perception that they are, individually and collectively, a resource – the influence of these developments has led to a more progressive approach to its practice and a more analytical approach to its history.²³²

The historical implications of industrial relations, especially during the period discussed in

229 For example Marshall, *Principles of Economics*, *passim*; Marshall, *Industry and Trade*, *passim*.

230 On the profusion of works and perspectives see David Gilbert, 'Strikes in post-war Britain', in Chris Wrigley, ed., *A History of British Industrial Relations, 1939 – 1979, Industrial Relations in a Declining Economy* (Cheltenham: Edward Elgar, 1996), p. 129; prominent among these are: Sidney and Beatrice Webb, *The History of Trade Unionism, Various Editions* (London: Longmans Green, 1894 - 1920); Sidney and Beatrice Webb, *Industrial Democracy, Various Editions* (London: Longmans Green, 1897 - 1920); F. D. Klingender, *The Condition of Clerical Labour in Britain* (London: Martin Lawrence, 1935); Jefferys, *Engineers*; K. G. J. C. Knowles, *Strikes: a study in industrial conflict* (Oxford: Blackwell, 1952); John T. Dunlop, *Industrial Relations Systems* (Carbondale: Southern Illinois University Press, 1958); Ernest Henry Phelps Brown, *The Growth of British Industrial Relations: a study from the standpoint of 1906-14* (London: Macmillan, 1959); Henry Pelling, *A History of British Trade Unionism, Various Editions* (Harmondsworth: Penguin, 1963 – 1992); H. A. Clegg, A. Fox, and A. F. Thompson, *A History of British Trade Unions since 1889* (Oxford: Clarendon, 1964 – 1994); A. Flanders, *Industrial Relations: What is Wrong with the System?* (London: Faber, 1964); Alan Fox, *Industrial Sociology and Industrial Relations, Research Paper No. 3* (London: HMSO, 1966); J. Clarke, C. Critcher, and R. Johnson, *Working Class Culture: studies in theory and history* (London: Hutchinson, 1979); Ernest Henry Phelps Brown, *The Origins of Trade Union Power* (Oxford: Oxford University Press, 1986); R. Croucher, *We Refuse to Starve in Silence: a history of the National Unemployed Workers' Movement, 1920-46* (London: Lawrence and Wishart, 1987); Howard F. Gospel and Gill Palmer, *British Industrial Relations*, Second Edition (London: Routledge, 1993).

231 Including, for example, *Industrial and Labour Relations Review*; *British Journal of Industrial Relations*; *Work, Employment and Society*; *Industrial Relations Journal*; *Human Resource Management Journal*; *Personnel Management*; *Employee Relations*.

232 For example, '... economic theories state that if an employer is to succeed, or even survive in the face of competition, he must treat his labour force as a factor of production, a cost to his business, like his non-human raw materials'. However, 'At the present time (the early 1990s) often under the banner of new-style Human Resource Management, there is increasing talk about the need to treat the workforce as a resource and an asset to be retained and developed for the longer term ...' moreover, 'Human Relations theorists argue that workers demand and need interesting, stimulating work [without which] employees will be alienated and uncooperative and managerial objectives difficult to achieve'. Gospel and Palmer, *Industrial Relations*, p. 37, 93; '... the predominant concern of employee relations is no longer about the role of collective bargaining, and the union as its agent, as about securing employee assent and expressing managerial commitment to achieving that assent'. Ian Beardwell, 'How Do We Know How It Really Is?' An Analysis of the New Industrial Relations', in Ian J. Beardwell, ed., *Contemporary Industrial Relations: A Critical Analysis* (Oxford: Oxford University Press, 1996), p. 7; for a detailed account of these developments see Boyce and Ville, *Development of Modern Business*, pp. 116 – 144.

this chapter, are well understood and routinely explored in the works of economic historians.²³³ In the sub-field of business history, however, prominent scholars have elected to disregard an aspect of industrial enterprise that, according to its leading exponent, was crucially significant. As well as exposing weaknesses in his approach, Chandler's somewhat inappropriate justification for his failure to address industrial relations – that its analysis would require 'a second volume as extensive as this one' – tacitly licenced others to be similarly casual.²³⁴ Thus, although one of the key advantages of comparative methodology has been described as its capacity to analyse the techniques used by different firms to overcome the same problems, in his much-cited *Strategy and Structure of British Enterprise*, Derek Channon allocated barely a thousand words to what he clearly regarded as one of British industry's most serious weaknesses.²³⁵ Moreover, having enumerated the perceived problems, he limited his appraisal of them to the arbitrary observation that British management 'got the industrial relations it deserved', but while this assertion implied strongly that the same rule applied, but with different outcomes, to firms in other countries, he produced no substantiating evidence.²³⁶ Nevertheless, Channon's meagre contribution to the industrial relations issue was larger than that of Leslie Hannah, another British scholar with Harvard connections who, in his comparative study, *Rise of the Corporate Economy*, completely disregarded the subject.²³⁷

Perhaps their tendency to focus on large-scale industrial corporations has led some business historians to identify mass-production methods with the most appropriate system, and to perceive the replacement of labour by automated manufacturing methods as one of

233 'Anyone with even the slightest interest in Britain's economy since the Second World War can hardly fail to recognize [labour relations] as a major, if not the single most important, factor in industrial performance – or in the lack of it'. Bernard W. E. Alford, 'New Industries for Old?', British industry between the wars', in Floud and McCloskey, *Economic History of Britain*, Vol. 2, p. 329; 'Labour markets and industrial relations are probably better understood than other elements in economic performance ...', Alford, *Britain in the World*, p. 270; for a concise review of what he terms the 'conventional wisdom' see Peter Nolan, 'Industrial Relations and Performance Since 1945', in Beardwell, *Contemporary Industrial Relations*, pp. 99 – 100; also, for example, Mathias, *First Industrial*, pp. 332 – 343; Dewey, *War and Progress*, pp. 11 – 13, 37 – 42, 116 – 141, 253 – 275, 280 – 282, 306 – 308; Cairncross, *British Economy*, Second Edition, pp. 9, 26, 108 – 109, 113, 114, 142, 145, 148, 151, 183, 193 – 196, 199, 220, 235, 256, 302; D. E. Baines, 'The labour supply and the labour market 1860 – 1914', in Floud and McCloskey, *Economic History of Britain*, Vol. 2, pp. 144 – 174; Aldcroft and Richardson, *British Economy*, pp. 14 – 15, 162 – 163, 174 – 178, 200 – 202.

234 Alfred D. Chandler Jnr., 'Comparative business History', in Coleman and Mathias, *Enterprise*, p. 3; Chandler, *Scale and Scope*, p. 13; on Chandler's 'contribution' to the industrial relations discussion see, Howard F. Gospel, 'Comparative Patterns of Labor-Management Relations: Great Britain, the US, and Japan', *Business and Economic History*, 2 (15), 1986: 119 – 131.

235 Channon, *Structure of British Enterprise*, pp. 41 – 42; this work is cited, for example, in Hannah, *Corporate Economy (both editions)*, *passim*; also in Bernard W. E. Alford, 'The Chandler Thesis – Some General Observations', in Hannah, *Management Strategy*, p. 66; Bernard W. E. Alford, 'Strategy and Structure in the UK Tobacco Industry', in Hannah, *Management Strategy*, p. 84; Leslie Hannah, 'Strategy and Structure in the Manufacturing Sector', in Hannah, *Management Strategy*, pp. 185 -186, 189, 199 – 202; Hannah, 'Visible and Invisible', in Chandler and Daems, *Hierarchies*, p. 72.

236 Channon, *Structure of British Enterprise*, pp. 40 – 42, 226, 231.

237 Hannah, *Corporate Economy (both editions)*.

management's fundamental goals. Clearly, in firms such as Ford where such principles were applied to their attainable limits, the employee's role in the workplace was largely governed through mechanical 'impersonal' controls.²³⁸ However, while such strategies were available in certain market sectors there can be no doubt that in many others, particularly for industrial goods like large diesel engines, this approach was not viable, at least during the period covered by this chapter. Thus, as Gospel and Palmer's range of typologies plausibly demonstrated, different types of firms adopted different broadly defined industrial relations strategies. Especially in firms like Gardner, whose complex, high-value, low-volume products necessitated the employment of a relatively large number of skilled artisans, the relationship between employers and workers was particularly important.²³⁹

More rigorous analyses of the relationship between firms and employees appear in the works of labour historians, social scientists, and other scholars whose studies, unlike those of many business historians, include small and medium-sized industrial firms that, like Gardner, were neither mass producers nor members of global oligopolies.²⁴⁰ Prominent among these, Piore and Sabel's study of manufacturers of high-quality products accentuated the importance of industrial relations in firms that relied on skills, while Steven Tolliday and Jonathan's Zeitlin's analysis of industrial relations in the automobile industries of Britain and the USA during the 1960s and 1970s proposed that many of the stereotypical perceptions regarding the workplace environment are misleading, a view supported by others. In both countries, they argued, the interaction between managers and workers on the shopfloor created a '... complex blend of power and constraint for both unions and management ...' and the outcomes of disagreements, when they arose, were greatly influenced by the attitudes of individuals directly involved. In Britain, they asserted, while the power of trade union officials in the workplace strengthened between 1965 and 1975, it was normally exercised '... in a flexible and co-operative manner except in periods of acute conflict'.²⁴¹

238 A theme repeatedly emphasized in Lewchuk, *American Technology*, also P. David, *Technical Choice, Innovation and Economic Growth* (Cambridge: Cambridge University Press, 1975).

239 In small and middling-sized enterprises like Gardner, industrial relations strategies are described as being 'simple, direct, and personal'. Gospel and Palmer, *Industrial Relations*, pp. 37, 53; also Fox, *Industrial Sociology*; John Purcell and Keith Sisson, 'Strategies and Practice in the Management of Industrial Relations', in George Sayers Bain, ed., *Industrial Relations in Britain* (Oxford: Blackwell, 1983), pp. 112 – 113.

240 'Few labour historians found persuasive Chandler's blanket assertion that, except in the case of the railroads, the work force had little impact on managerial decision making ...', John, 'Elaborations', p. 190; also Bowden, Foreman-Peck, and Richardson, 'Post-war Productivity', pp. 54 – 78; also Kenneth D. Brown, 'Unions and Management in Engineering: A Case Study, 1964-79', *Business History*, 47 (1), 2005, pp. 86 – 101; Marek Korczynski, 'The Restrictive Practices of Capital: Employer Commercial Opportunism, Labour Militancy and Economic Performance in the Engineering Construction Industry, 1960-80', *Business History*, 41 (3) 1999, pp. 134 – 160; Nick Tiratsoo and Jim Tomlinson, 'Restrictive practices on the shopfloor in Britain, 1945-60: myth and reality', *Business History*, 36 (2), 1994, pp. 65 – 83; Jim Tomlinson, 'The Government and the Car Industry, 1947 – 1970', *Journal of Transport History*, 20 (1), 1999, pp. 17 – 29.

241 Piore and Sabel, *Second Industrial, passim*; for example, 'Compared with Germany, days lost to strikes per employee between 1966 and 1970 were 38 times higher in Britain and 99 times

Most observers accept that conflict in the workplace was inevitable, and some have outlined the various strategies available to employers for dealing with it. However, 'acute' conflict suggests the adoption of fundamentally contrasting and uncompromising positions, often centred on ill-defined and longstanding assertions concerning regulations and the rights of workers on the factory floor where senior, junior, and middle managers necessarily and constantly interacted with employees.²⁴² Clearly, under such conditions, the 'adversarial' approach to industrial relations, commonly embraced by firms during the 1960s and 1970s, offered little scope for employees to express their feelings, and their only means of communicating their dissatisfaction with management was to adopt obstructive behaviour.²⁴³

The rising level of industrial disputes in sectors of the British manufacturing engineering industry between 1960 and 1975 ostensibly confirms the widely held perception that, during this period, the relationship between employers and employees became increasing dysfunctional.²⁴⁴ Depending on the viewpoint of the writer, responsibility for the breakdown has been attributed jointly and severally to government intervention (which steadily turned into interference); ineffective negotiating procedures; outdated remunerations systems; over-powerful trade union officials, and weak or incompetent management.²⁴⁵ In the context of the

higher in the United States'. Ronald Philip Dore, William Lazonick, and Mary O'Sullivan, 'Varieties of Capitalism in the Twentieth Century', *Oxford Review of Economic Policy*, 15 (4), 1999, p. 110; Steven Tolliday and Jonathan Zeitlin, 'Shop-Floor Bargaining, Contract Unionism and Job Control: An Anglo-American Comparison', in Tolliday and Zeitlin, *Workers*, pp. 99 – 120.

242 The settlements of the 1897 and the 1922 'lock-outs' established certain 'rights' concerning management and labour is discussed in, W. R. Garside, 'Management and Men: Aspects of British Industrial Relations in the Inter-War Period', in Supple, *Essays*, p. 253; considered in more detail in Jonathan Zeitlin, 'The Labour Strategies of British Engineering Employers, 1890 – 1922', in Howard F. Gospel and Craig R. Littler, eds., *Managerial Strategies and Industrial Relations, An Historical and Comparative Study* (Aldershot: Gower, 1983), pp. 25 – 54, esp. pp. 34 – 35; also in Edmund and Ruth Frow, *Engineering Struggles, Episodes in the Story of the Shop Stewards' Movement* (Manchester: Working Class Movement Library, 1982), pp. 22 – 24, 81 – 82; and in Lewchuk, *American Technology*, pp. 86 – 88.

243 'Adversarial [employee relations]: the organization decides what it wants to do, and employees are expected to fit in. Employees [can] only exercise power by refusing to cooperate'. Michael Armstrong, *Strategic Human Resource Management, A Guide to Action* (London: Kogan Page, 2000), p. 244.

244 Following 'a seven year peace' the overall level of strike activity in British industry between 1953 and 1959 'was firmly up', and between 1960 and 1968 there was 'a substantial growth in the number of shop-floor stoppages' which rose steeply in 1969, fell sharply in 1971, but resumed a 'familiar upward path' thereafter. J. W. Durcan, W. E. J. McCarthy, and G. R. Redman, *Strikes in Post-War Britain, A Study of Stoppages of Work Due to Industrial Disputes, 1946-73* (London: George Allen and Unwin, 1983), pp. 26, 171.

245 This range of issues is discussed in Gospel and Palmer, *Industrial Relations*, p. 71; Stephen Wilks, 'Institutional insularity: government and the British motor industry since 1945', in Martin Chick, ed., *Governments, Industries and Markets* (Aldershot: Edward Elgar, 1990), p. 161; Tiratsoo and Tomlinson, 'Restrictive practices', p. 65; Lloyd-Jones and Lewis, *Capitalism*, pp. 171, 181, 187, 192; Korczynski, 'Restrictive Practices', p. 134; Brown, 'Unions and Management', p. 86; Nolan, 'Industrial Relations', in Ian Beardwell, *Contemporary Industrial Relations*, p. 107; Alan Booth, 'The Manufacturing Failure Hypothesis and the Performance of British Industry During the Long Boom', *Economic History Review*, 56 (1), 2003, pp. 1 – 33; Keith Laybourn, *A History of British Trade Unionism c. 1770 - 1990* (Stroud: Alan Sutton, 1992), pp. 181, 375 – 376; Cairncross, 'Economic Policy and Performance, 1964 - 1990', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 76 – 77; H. A.

British manufacturing engineering industry, and especially where they involve firms like Gardner, these issues are summarized and explored below.

The Role of Governments

It is clear that micro- and macroenvironmental factors emerging during the decade following the end of the Second World War directly influenced the relationship between employers and employees in the British manufacturing engineering industries. While some historians believe that the wartime co-operation between the state, enterprise, and workers endured for many years after 1945, others hold different views. Believing the level of collaboration to be somewhat overstated, one contemporary observer has proposed that, as trade unions demanded the repeal of concessions yielded during the conflict, and companies sought to restore the 'managerial functions' they had ceded to the state, discord quickly emerged.²⁴⁶ Although it seems probable that, over time, such differences would have been resolved without government intervention, the advent of the Korean War in 1950 made this less likely. Its global economic impact, especially worldwide shortages of raw materials, and the domestic consequences, such as the re-expansion of Britain's military capacity, brought with it state controls and a partial return to pre-1945 conditions.²⁴⁷ Thereafter, although opinion varies somewhat, a pattern of recurring economic crises drew successive governments into direct action aimed at achieving stability.²⁴⁸

Such intervention had been firmly rejected by the first post-war Labour administration and neither was it immediately espoused by the post-1951 Conservative government.²⁴⁹ Soon

Clegg, *How to Run an Incomes Policy and Why We Made Such a Mess of the Last One* (London: Heinemann, 1971), pp. 61 – 67; H. A. Turner, Garfield Clack, and Geoffrey Roberts, *Labour Relations in the Motor Industry: A Study of Industrial Unrest and an International Comparison* (London: Allen and Unwin, 1967), pp. 211 – 212.

246 According to Laybourn, '... a wartime consensus between employers, the state and unions ... survived at least until the late 1960s ...'; Laybourn, *History of British Trade Unionism*, p. 157; however, a contemporary chronicler observed, 'The temporary identity of interests between the employers and the shop stewards during the war was shattered when the war ended ...', Edmund and Ruth Frow, *Engineering Struggles*, pp. 145 – 201, 220 – 262; also Richard Croucher, *Engineers At War 1939 – 1945* (London: Merlin, 1982), *passim*; Cairncross, 'Economic Policy', p. 46; Jeremy, *Business History of Britain*, p. 58.

247 With the outbreak of war in Korea government controls '... returned with a vengeance ...' Zeitlin, 'Reconciling', p. 18; the '... process of transition to a peacetime economy was still in progress when the Korean war broke out in 1950', Dunnett, *Decline*, p. 31; An early effect of the Korean crisis included 'physical shortages of raw materials [that] multiplied, creating bottlenecks and limiting production'. Cairncross, *British Economy*, Second Edition, p. 101.

248 For example, '... in December 1950 Britain was 'home free', and even the severe deficit on balance of payments of 1951 - a product of the Korean War - could not reverse her upward course', David S. Landes, *The Unbound Prometheus: Technological Change in Western Europe from 1750 to the Present* (Cambridge: Cambridge University Press, 1969), p.496; however, '... the Korean War and the stockpiling crisis associated with it in 1951 caused the third of what threatened to be regular economic crises in alternate years, [but] British economic recovery was by then firmly set'. Pollard, *Development*, p. 197; also Pollard, *Wasting*, p. 37; Cairncross, *British Economy*, Second Edition, p. 117.

249 'In spite of the exhortations of public officials in the Economic Section and the Economic Information Division of the Treasury, Conservative ministers proved dilatory about developing any wages policy at all. It was only when Macmillan became Chancellor in 1955, that a white

however, a perceived steady increase in labour costs, as well as an upsurge in industrial disputes, brought the theme of regulatory legislation to the attention of politicians.²⁵⁰ The concept of controlling inflation by limiting prices and incomes, either through voluntary restraints or legally binding agreements, steadily gained credence until, by the mid-1950s, government ministers were urging union leaders to adopt a responsible stance in the face of their members' escalating wage demands.²⁵¹ However, as rising inflation continued to cause concern the first in a long series of formal measures intended to curb the growing cost of labour was introduced.²⁵² Thereafter, sporadic and occasionally intense trade union opposition notwithstanding, there followed a series of relatively short-lived government sponsored commissions, boards, and directives.²⁵³ Although most of these were at best modestly successful, they had unforeseen and far-reaching consequences for workplace industrial relations. Far from achieving their intended outcomes, they seem to have engendered an enduring attitude among workers that government restrictions, whether they were officially approved by the unions or not, could be circumvented through a

paper ... was published on the subject'. Noel Whiteside, 'Industrial Relations and social welfare, 1945-79', in Wrigley, *British Industrial Relations*, p. 116.

- 250 'Between 1953 and 1959 stoppages outside coal mining ... rose by nearly 80 per cent ...' Gospel and Palmer, *Industrial Relations*, p. 221; also Durcan, McCarthy, and Redman, *Strikes in Post-War Britain*, pp. 26 – 171; Gilbert, 'Strikes', in Wrigley, *British Industrial Relations*, pp. 133 – 142; 'As early as 1958, the basic framework had already been widely aired by Conservative lawyers ... which was to be the basis of much of the 1971 Industrial Relations Act'. Chris Wrigley, 'Trade Unions and the 1964 General Election' *Contemporary British History*, 21 (3), 2007, p. 329.
- 251 'It was not until 1956 that [the conservative government] issued The Economic Implications of Full Employment, a pamphlet ... arguing the need for stability in wages ... In the same year Macmillan entered into talks with employers and employed, hoping to persuade them to hold prices and wages steady'. Cairncross, 'Economic Policy and performance, 1945 – 1964', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 61; Sir Alexander Cairncross, 'The post-war years 1945 – 77', in Floud and McCloskey, *Economic History of Britain*, Vol. 2, p. 393; Cairncross, *British Economy*, Second Edition, pp. 135, 141, 145, 154, 157 – 158, 162, 194, 290, 171, 197 – 198; Cairncross, 'Economic Policy', pp. 62 – 63; Laybourn, *A History of British Trade Unionism*, pp. 173 – 175; Chris Wrigley, 'Trade union development, 1945 – 79', in Wrigley, *British Industrial Relations*, p. 78; Durcan, McCarthy, and Redman, *Strikes in Post-War Britain*, p. 373; Gospel and Palmer, *Industrial Relations*, pp. 211, 246 – 247.
- 252 The Council for Prices, Productivity and Incomes (COPPI) was appointed in August 1957, Robert J. Davies, 'Incomes and Anti-Inflation Policy', in Bain, *Industrial Relations*, p. 419; Cairncross, *British Economy*, Second Edition, pp. 113 – 114, 141; Whiteside, 'Industrial Relations', in Wrigley, *British Industrial Relations*, pp. 116, 119; Patrick Maguire, 'Labour and the law: the politics of British Industrial Relations, 1945 – 79', in Wrigley, *British Industrial Relations*, pp. 49 – 51; Laybourn, *A History of British Trade Unionism*, pp. 173 – 175; Chris Wrigley, 'Trade union development, 1945 – 79', in Wrigley, *British Industrial Relations*, p. 78.
- 253 The most important of these are listed in Table 9.3 in Gospel and Palmer, *Industrial Relations*, p. 230; also in Appendix 1 in Cairncross, *British Economy*, Second Edition, pp. 308 – 312; Policy Studies Institute at the University of Westminster, appendix D, Government Policies, Government Measures in the United Kingdom, 1945 – 1980, <http://www.psi.org.uk/publications/archivepdfs/Innovation%20and%20Indust/APPD.pdf>, pp. 155 – 157; also Nina Fishman, TUC History Online, http://www.unionhistory.info/timeline/1960_2000.php.

demonstration of their willingness to undertake industrial action.²⁵⁴

Formal and Informal Arbitration Procedures

Hypothetically, disputes in the manufacturing engineering industries could be resolved through a range of established formal procedures in force throughout most of the twentieth century. Based on an agreement negotiated after the 1898 engineering lockout, the 'Provisions for the Avoidance of Disputes' was an 'understanding' originally reached between the engineering unions and the Engineering Employers' Federation (EEF) in April 1914 and revised '...at the close of [the] prolonged and embittered conference' following another lockout in 1922. They were, however, fundamentally outdated and largely inappropriate for post-Second World War workplace conditions. Strongly biased towards the employers' interests, the 'Provisions' entailed lengthy, highly strictured, and formulaic proceedings that often took many months to conclude, encouraging shop stewards to coerce management - and occasionally vice versa - into direct dialogue at plant level.²⁵⁵ Such 'semi-legitimate' discussions are regarded by many to have been at the centre of the perceived anarchic nature of post-war workplace industrial relations, and are therefore often presented as one of the main reasons for Britain's industrial decline.²⁵⁶

254 'In the end, it became clear to organized workers that the power to organize an effective strike was the only way to bargain with ... government'. Laybourn, *History of British Trade Unionism*, p. 175; Alan Campbell, Nina Fishman and John McIlroy, eds., *British Trade Unions and Industrial Politics* vol. 1, *The post-war compromise, 1945-64* (Aldershot: Ashgate, 1999), pp. 103; Alan Campbell, Nina Fishman and John McIlroy, eds., *British Trade Unions and Industrial Politics*, vol. 2, *The High Tide of Trade Unionism, 1964-79* (Aldershot: Ashgate, 1999), p.120; Durcan, McCarthy, and Redman, *Strikes in Post-War Britain*, pp. 26 – 171, 373 – 374.

255 See Jefferys, *Engineers*, pp. 152, 160, 165, 222, 227, 231, 236, 243; For Laybourn, the Provisions '... were nineteenth century in origin. They belonged to an industrial structure which had passed'. Laybourn, *History of British Trade Unionism*, pp. 340 – 341, 323 – 324; also Sisson, 'Employers' Organizations', p. 127; for a particularly critical analysis of the evolution of the 'Procedures' see Edmund and Ruth Frow, *Engineering Struggles*, pp. 23, 270, 471 - 477; for more specific observations on the 'Provisions' from an AEU perspective see B. C. Berridge, 'Failure to Agree', *AEU Monthly Journal*, April 1943, p.100; also 'Your Union and You: Chapters in AEU History, XII – Union Negotiations and Agreements', *AEU Monthly Journal*, July 1943, p. 178; regarding 'coercion' see Raymond Robinson interviewed by Ruth Frow and Edmund Frow, tape recording, July 1976., ref. 231A, 2000.1037; Foreman-Peck, Bowden and McKinlay, *Motor Industry*, pp. 166 – 167; also Jeffrey Haydn, *Between Craft and Class: Skilled Workers and Factory Politics in the United States and Britain, 1890-1922* (Berkeley: University of California Press, 1991), pp. 72, 94 – 95, 97, 102 – 103, 168, 172; The 'Provisions for the Avoidance of Disputes' is also described in Turner, Clack, and Roberts, *Labour Relations*, p. 250; its operation analysed in A. I. Marsh and R. S. Jones, 'Engineering Procedures and Central Conference at York in 1959: a Factual Analysis', *British Journal of Industrial Relations*, 2 (2), 1964, pp. 228 – 250; also Confederation of Shipbuilding and Engineering Unions, *Handbook of National Agreements* (London: Charles Mitchell, 1964).

256 For example, the Donovan Commission, established in 1965, the Government White Paper 'In Place of Strife' in 1969, and the Industrial Relations Act in 1971, see Peter Maunder, ed., *The British Economy in the 1970s* (London: Heinemann, 1980), p. 127; 'The (Donovan) Commission argued that the decaying national and industry-wide system of collective bargaining had allowed disorder and informality to flourish in the workplace'. Nolan, 'Industrial Relations', in Beardwell, *Contemporary Industrial Relations*, p. 107; also M. Terry, 'Shop Steward Development and Managerial Strategies', p. 73; Brown, 'Unions and Management', in Bain, *Industrial Relations*, p. 86.

Remunerations Systems

By the 1960s, the number of stoppages taking place without official union sanction or occurring before formal negotiation procedure had been exhausted was increasing.²⁵⁷

Usually brief, limited to a single factory or section and involving a relatively small number of employees, the link between such actions and the prevalence of piecework systems, also known as 'Payment by Results' (PBR) is conspicuous.²⁵⁸ Typical of PBR schemes in the engineering industries, by the late 1950s the Manchester Piecework Agreement, first drawn up in 1918, had become extremely complex.²⁵⁹ (see Appendix 3) Its most potentially disruptive aspect lay in the right of individual workers to renegotiate the rate for each task when alterations in manufacturing methods led to changes in production processes. Their prerogative, if not satisfied, to eschew piecework bonus and revert to 'day-work', essentially effecting a 'go-slow', made transactions surrounding PBR especially sensitive and minor disagreements were common. Because they naturally emerged in the workplace, the mutually beneficial interest in maintaining the flow of production created time constraints that made their resolution through formal Procedures impracticable. Although cultural differences set much of the agenda and conflict was not always avoided, under normal circumstances pragmatism usually dictated outcomes.²⁶⁰ There can be no doubt, however, that although some managers believed that PBR encouraged effort, shop stewards knew well how to manipulate the inherent vagaries of systems such as the Manchester Piecework Agreement to suit their own agendas.²⁶¹

The Role of Shop Stewards

By the mid-twentieth century, the influence of shop stewards in the manufacturing engineering industries, directly traceable to the spread of PBR at the end of the nineteenth

257 Gospel and Palmer, *Industrial Relations*, p. 221; Howard F. Gospel, 'The management of labour', in Wrigley, *British Industrial Relations*, p. 89.

258 'Unofficial and wildcat strikes ... accounted for 95 per cent of industrial stoppages and were becoming more common. About half the wildcat strikes concerned wages ...' Channon, *Structure of British Enterprise*, p. 42; 'Up to the late 1960s, strikes were not a major problem but by the late 1960s the British car firms had identified the piece-work system as the principal cause of productivity problems ...' Millward, 'Industrial and Commercial', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 143 – 144; also Lewchuk, *American Technology*, pp. 1 – 5.

259 On PBR in the engineering industries see Jefferys, *Engineers*, pp. 188 – 189; on some of the historical iniquitous aspects of PBR, from the point of view of a leftwing trade unionist, see Edmund and Ruth Frow, *Engineering Struggles*, pp. 122, 127 – 128, 174, and *passim*.

260 '... the personalities of the parties involved, the dominant idea of the time (and), the parties' perceptions of the historical background against which they operated ... probably influenced behaviour and attitudes'. Durcan, McCarthy, and Redman, *Strikes in Post-War Britain*, pp. 412 – 413; also Foreman-Peck, Bowden and McKinlay, *Motor Industry*, p. 172; For a detailed description of the complexity of PBR see Turner, Clack, and Roberts, *Labour Relations*, pp. 155 – 164; Wayne Lewchuk, 'The Motor Vehicle Industry', in Elbaum and Lazonick, *Decline of the British Economy*, p. 140; for a trade unionist's perception regarding some of the intricacies of PBR see Edmund and Ruth Frow, *Engineering Struggles*, pp. 235 – 237; Tolliday and Zeitlin, 'Shop-Floor Bargaining', pp. 99 – 120.

261 John K. Gardner interviewed by Ruth Frow, tape recording, July 1976, ref. tape no. 87, 2000.0882; Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 27 September 2003; Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 24 October 2003.

century, had become established.²⁶² However, depending on the perspective of the observer, opinions of their role in the workplace vary. To full-time officials shop stewards were custodians of the trade union ethos, upholders of trade union policies and in the vanguard of resistance to any attack on trade union rights. To their departmental colleagues, however, from whose democratic votes and active support their power was derived, the shop stewards' primary function was to represent their individual and collective interests in the workplace.²⁶³ Clearly, it was not always possible to satisfy the expectations of both groups. When the exigencies of full-time officials ran counter to the interests of ordinary union members, and especially when industry wide settlements reached through collective bargaining restricted their perceived right to press for higher wages, the shop stewards' strategies often conflicted with official trade union policy. Moreover, while full-time officials were obliged by convention to adhere to the Provisions for the Avoidance of Disputes, the shop stewards' physical presence allowed them to actively and regularly challenge management in the workplace. Unsurprisingly, because shop stewards had the power to mediate as well as to confront, many workers tended to view them, rather than senior union officials, as their true leaders.²⁶⁴

In general, while shop stewards have been held responsible for many of the more serious shortcomings of British industrial enterprise, they have also been credited with having some positive effects in the workplace. Among their perceived beneficial attributes, their status as elected representatives combined with, in the case of skilled engineering employees, their knowledge as fully trained and highly specialized craftsmen, are thought to have led to their being regarded as potentially ideal intermediaries and quasi-supervisors whose technical experience could be accessed and used to increase efficiency. On the other hand, their alleged tendency to foster restrictive practices and obstruct the installation of modern manufacturing equipment and methods are considered to have hindered British industry's response to international competition.²⁶⁵ Another, somewhat less convincing, indictment is

262 For a summary of the role of shop stewards as specified by the 1922 Working Conditions agreement, 'Your Union and You: Chapters in AEU History, XII – Union Negotiations and Agreements', *AEU Monthly Journal*, July 1943, p. 178.

263 At Gardner, and most other manufacturing engineering firms, shop stewards were elected annually in departmental ballots. See Jefferys, *Engineers*, p. 261; Laybourn, *History of British Trade Unionism*, pp. 172, 340 – 341, 412 – 413; also Ken Coates and Tony Topham, 'Shop Stewards and Workplace Trade Unionism', chap. 5 in *Trade Unions in Britain, Third Edition* (London: Fontana, 1988), p. 143; Larry James, *Power in a Trade Union, The role of the District Committee* (Cambridge: Cambridge University Press, 1984), pp. 14 – 17.

264 For an account of a specific example of such paradoxical issues see, Larry James, 'The District Committee and the Executive Council: a case study in negotiated outcomes', chap. 5 in *Power in a Trade Union*, p. 62; 'Over the years ... there was inevitable conflict between the shop stewards and the union officials'. E. and R. Frow, *Engineering Struggles*, p. 270; Church, *Rise and Decline*, p. 116; Gospel and Palmer, *Industrial Relations*, pp. 202 – 204, 208 – 214; Keith Laybourn, *History of British Trade Unionism*, p. 172; P. K. Edwards, 'The Pattern of Collective Industrial Action', in Bain, *Industrial Relations*, p. 213.

265 For Dunnnett the role of shop stewards was partly beneficial, partly detrimental in that they '... played an important role ... in co-ordinating the activities of the workers ...', but some, motivated by irrational and hostile impulses, assisted 'bloody-minded' small groups of

that it was their ability to forestall serious disputes and encourage individual workers to increase output that made of shop stewards responsible for delaying the introduction of professional personnel management in British firms.²⁶⁶ In general, however, shop stewards have been characterized – and occasionally caricatured – by their perceived ability to provoke disputes and instigate unofficial strikes.²⁶⁷

The Role of Managers in the Workplace

Although opinion on the role of British managers is equally varied, in general they are accused of performing badly in the perceived struggle for power in the workplace.²⁶⁸ Often cited as evidence of management weakness, it has been proposed that a deceptive quasi-conspiracy between junior and middle managers and shop stewards produced a *de facto* 'informal' system of industrial relations. On the other hand, it has been suggested that such arrangements can be viewed as co-operation rather than collusion, and that allowing departmental shop stewards to undertake certain basic administrative tasks was simply the imaginative use of available resources.²⁶⁹ Moreover, it is clear that the realities of workplace

workers, employed in critical operations, to exploit their positions to the detriment of colleagues who depended upon them. Furthermore 'jealousies and antagonism' arose as full-time union officials came to realize that 'shop stewards ... really represented the shop-floor'. Dunnett, *Decline*, pp. 52, 110; assertions that shop stewards promoted restrictive practices have been questioned by Tiratsoo and Tomlinson, 'Restrictive practices', pp. 65 – 83; also Millward, 'Industrial and Commercial', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 150 – 154; Lewchuk, 'Vehicle Industry', pp. 148 – 149; Laybourn, *History of British Trade Unionism*, pp. 172, 340 – 341, 412 – 413.

- 266 Shop stewards '... were critical for maintaining labour peace and eliciting effort ...' permitting British industrialists '... to continue to avoid investment in personnel management, while creating a coherent, if informal, system of employment relations'. William Lazonick, 'Employment Relations in Manufacturing and International Competition', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 2, pp. 114 – 115.
- 267 '... industrial relations ... as far as the media are concerned ... is about ... strikes ...' Gospel and Palmer, *Industrial Relations*, p. 1; also Edwards, 'The Pattern', in Bain, *Industrial Relations*, p. 213; In the 1960s, the popular BBC television series 'The Rag Trade' amusingly caricatured workplace industrial relations in Britain. Mr. Fenner (Peter Jones), the owner of a small clothing company, had daily confrontations with his workforce, and particularly with the Shop Steward, Paddy (Miriam Karlin).
- 268 'More fundamentally, these [industrial] disputes reflected weakness in management and industrial organization. ... The causes [of industrial disputes in the second half of the 1960s] were, in many cases, weak management ...', Alford, *Britain in the World*, pp. 241, 270; 'The weakness of supervisory staff in Britain posed problems for the management of work and Industrial Relations'. Howard F. Gospel, 'The management of labour', in Wrigley, *British Industrial Relations*, p. 87; 'Besides inadequate investment, poor management ... have been blamed for the low rate of British economic growth'. Pollard, *Development*, p. 299.
- 269 'Senior management were held culpable for neglect, and for being too ready to allow foremen and supervisors to enter into covert and cozy deals with the rapidly expanding ranks of shop-floor trade union representatives'. Nolan, 'Industrial Relations', in Beardwell, *Contemporary Industrial Relations*, p. 107; 'Britain has two systems of Industrial Relations. The one is the formal system embodied in the official institutions. The other is the informal system created by the actual behaviour of trade unions, employers' associations, of managers, shop stewards and workers'. quoted in, Pelling, *History of British Trade Unionism*, p. 254; also Jeremy, *Business History of Britain*, p. 456; According to Terry, allowing shop stewards to perform managerial tasks relating to labour efficiency such as worker effort, overtime schedules and work organization, were seen by many senior and middle managers as 'an effective system of handling problems and grievances'. Terry, 'Shop Steward Development', in Bain, *Industrial Relations*, p. 73.

industrial relations were expressed on a daily basis in the machine shop or on the assembly line where managers and employees, both collectively and individually, interacted, and where the potentially harmful consequences of unresolved problems called for rapidly applicable solutions and 'on the spot' concurrence between parties. Thus, the issue of management weakness and incompetence appears to hinge on whether such conditions are regarded as a 'disarticulated system of industrial relations' or merely the normal functioning of a process well understood and accepted by managers, shop stewards and workers.

III Macroenvironmental Background

By the mid-1960s, government attempts to formulate a lasting solution to Britain's seemingly perennial cyclical microeconomic problems had failed. The National Economic Development Council, created in 1961, seems to have lacked the powers or support necessary to influence business, and although the Department of Economic Affairs that replaced it in 1964 enjoyed wider sponsorship as well as co-operation from the trade unions, neither of these bodies achieved the relatively modest goals they were set. Significantly, however, although both were intentionally and expressly interventionist, their effect on firms like Gardner seems to have been both minor and indirect. Their successor, the Industrial Reorganization Corporation, established in 1966, was somewhat more influential. As its designation suggests, the IRC's purpose was to reorganize (and rationalize) British industry in order to make it more internationally competitive. Its major defects were that it was to be operated and controlled by 'leading businessmen' – ostensibly seconded from the group responsible for the existing problems – and its fallacious preconception that large-scale firms were the embodiment of manufacturing efficiency.²⁷⁰

Between 1966 and 1970, sectors of the British manufacturing engineering industries, especially motor vehicles, were transformed by the IRC. However, much of the intervention it carried out was in the furtherance of ideological or party political considerations, the nature of which can be understood by the proliferation of ministerial departments, boards and committees, many of which were essentially interest groups linked to specific industry sectors. While some of the resulting takeovers and mergers ended in complete failure, the

270 Pollard, *Development*, p. 346; Jim Tomlinson, 'British Economic Policy Since 1945', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 275; The IRC 'espoused the idea that British firms were too small in comparison with their foreign competitors and were not likely to be re-grouped into larger, more efficient units through the operation of market forces'. Cairncross, *British Economy*, Second Edition, pp. 15, 105, 150, 172; 'It [the IRC] had pump priming funds of £150 million and its group of independent businessmen were expected to act as merger brokers. Size was seen as key to industrial efficiency and unlikely to emerge voluntarily in a satisfactory form'. Millward, 'Industrial and Commercial', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 162; '... the Industrial Reorganization Corporation [was established] to bring about industrial "rationalization" or reorganization by encouraging mergers which were thought to be justified on the grounds of economies of scale, better management, and improved international competitive strength'. Michael C. Fleming, 'Industrial Policy', in Maunder, *Economy in the 1970s*, p. 143; '... the driving principle of government intervention in industry was that it would promote greater productivity and competitiveness. But it was a principle based on a belief that "big" is beautiful. ... [an] approach [that] was a mixture of half-truth and mistaken analysis'. Alford, *Britain in the World*, pp. 256, 261, 263.

ultimate outcome of many others was disappointing. It also seems clear that a considerable number were undertaken in order to reduce competition rather than in the interests of efficiency and productivity. Moreover, intervention on the scale undertaken during the 1960s and 1970s appears to have had little beneficial impact on the perceived declining competitiveness of Britain's manufacturing engineering industries, and some evidence suggests that its overall effect may well have been negative.²⁷¹

By dissolving the institutions set-up under the previous regime, the Conservative administration that was elected to power in 1970 signalled its intention to allow industry to function in an environment more consistent with free market conditions. However, when major upheavals in the international macroeconomic environment rendered two of Britain's largest manufacturers exposed the explicit rejection of the policy of sustaining failing firms proved to be a somewhat embarrassing pronouncement. The government's response amounted to a complete reversal of its position – a change that became known as 'Heath's U-Turn' – and a return to active intervention. As the industrialised economies of the world fell into recession, the British government introduced expansionary measures aimed at restoring the conventional post-war commitment to full employment.²⁷²

Consequently, in early 1973 the British economy began to emerge from the slump at a time when most other industrialised nations were experiencing similar surges in growth. The resulting rapid increases in the prices of primary materials created inflationary conditions that were greatly exacerbated by an abrupt and unprecedented sharp increase in the price of crude oil towards the end of the year. For the rest of the decade, unemployment and inflation remained at higher levels than had hitherto been considered acceptable, stimulating the concept that government faced a choice between one and the other.²⁷³

271 'The Leyland merger proved to be a milestone in the collapse of the British [owned] motor industry'. Alford, *Britain in the World*, p. 262; 'There is evidence that government pressure and the compensation of large subsidies caused some firms to pursue strategies that did not, in their independent judgement, make long-term commercial sense'. ;*idem*, p. 264; On the various committees, boards etc. see Millward, 'Industrial and Commercial', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, pp. 162 – 164; Between 1966 and 1970 'In spite of elaborate provisions for 'fair trading' and against monopolies, [the government] was at times itself enforcing or encouraging the monopolistic organization of industry ...' see also Pollard, *Development*, p. 261.

272 The conservative government which came to power in 1970 attempted to '... disengage from intervention in industry ...', Cairncross, *British Economy*, Second Edition, p. 183; '... a different posture [was adopted when] the general policy avowed of hardened realism ... rapidly turned to pragmatism'. Coopey and Woodward, 'Overview', in Coopey and Woodward, *Britain in the 1970s*, pp. 17 – 18; Fleming, 'Industrial Policy', in Maunders, *Economy in the 1970s*, p. 143.

273 Cairncross, 'Economic Policy and Performance, 1964 - 1990', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 79; Feinstein, 'Success and Failure', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 112; Cairncross, *British Economy*, Second Edition, pp. 38 – 39, 183; Max-Stephan Schulze and Nicholas Woodward, 'The Emergence of Rapid Inflation', in Coopey and Woodward, *Britain in the 1970s*, p. 112; Alford, *Britain in the World*, p. 297; Dilwyn Porter, 'Government and the Economy' in Coopey and Woodward, *Britain in the 1970s*, p. 42; Nina Fishman, *TUC History Online*, http://www.unionhistory.info/timeline/1960_2000_4.php.

IV Microenvironmental Background

There are virtually no references in extant chronicles and media sources to the contributions made to the development of L. Gardner and Sons by its employees. According to David Whitehead's 'official' history, the firm's paternalistic inclinations included the provision of sports facilities, a library, and a social club, most of which appear to have ceased to exist well before the mid-twentieth century.²⁷⁴ Official trade union records covering the first half of the twentieth century are also sparse, but a depiction of the relationship between the firm's management and its workforce can be formed from the recollections of a long-serving employee. Arthur Walmsley, a skilled craftsman and a trade union activist, worked at Gardner from 1924 to 1927, and from 1933 until his retirement in the late 1950s. In an interview recorded in 1976, he recalled that, during his first period of employment at Gardner, trade union activities were pervasive and well organized. However, following the general strike of 1926, which the Gardner workforce supported, union membership declined until, by 1933, a general lack of interest had set in.²⁷⁵

As the size of the Gardner workforce increased following the introduction of the firm's successful automotive range of diesel engines, union membership began to rise. By 1936, most of the skilled workers had joined the AEU, and several sections of the factory had begun to elect shop stewards. Subsequently a formal approach was made to the local employers' federation who agreed to recognize Gardner as an 'organized' shop. Thereafter, a dialogue was established between the Works Committee, a body elected by and of the shop stewards, and the management, normally represented by Harold Hunter, the works manager. Although direct contact between union officials and Gardner family directors were infrequent, Thomas Harry or Eric usually took part in discussions concerning potentially major changes. Other than a strike by apprentices involving various engineering firms in the Manchester area, details of which are vague, there were few disputes at Gardner during the immediate pre-war years, and the relationship between the firm and its employees seems to have been reasonably amicable.²⁷⁶

Records relating to workplace industrial relations at Gardner during the Second World War are also extremely sparse. However, there can be little doubt that, in line with the trend throughout the British manufacturing engineering industries, virtually the whole of the Gardner labour force were members of a trade union. It also seems reasonable to assume that the number and influence of shop stewards also increased after 1939, and that they may have taken part in some form of consultative process.²⁷⁷ Nevertheless, it is important to

274 Whitehead, *Gardners*, p. 15.

275 Arthur Walmsley, Interviewed by Edward and Ruth Frow, tape recording, 1976, Working Class Movement Library, Archive Ref. 259A 2000.1061.

276 Ibid.

277 'The (1939 – 1945) war led to a much larger role for trade unions, whose membership rose [leading to] a rise in the number and influence of shop stewards'. Dewey, *War and Progress*,

understand that Gardner was not, either then or at any time, a closed shop.²⁷⁸

In the immediate post-war years the majority of trade union members at Gardner, who worked in the machine shops and assembly sections, were members of the AEU. In the aluminium and iron foundries, where employment was significantly lower, most were members of the Amalgamated Union of Foundry Workers (AUFW). Both unions were affiliated to the Confederation of Shipbuilding and Engineering Unions (CSEU), and although nationally coordinated directives were fully supported, at Gardner they appear to have preferred to conduct their affairs independently. In general, however, all union members took part in annually held democratic elections. Departmental shop steward, chosen by secret ballot, formed a shop stewards' committee which in turn elected the smaller Works Committee led by the Chairman and the Convenor; traditionally the two most influential union officials in the works.²⁷⁹ Probably reflecting the moderate disposition of most of the Gardner employees, at the Manchester district headquarters of the AEU, Gardner was thought of as a firm where the management 'got all there own way'.²⁸⁰

Evidence revealed by the research strongly suggests that, after 1955, the Gardner management, eschewing the more paternalistic approach of earlier regimes, adopted an increasingly detached posture towards the employees.²⁸¹ Frequent complaints concerning the general working environment in the plant, even when couched in terms of their negative effect on productivity, received little sympathy.²⁸² More emphatic protests regarding the

pp. 307 - 308; also Edmund and Ruth Frow, *Engineering Struggles*, pp 145 – 201; Foreman-Peck, Bowden, and McKinlay, *Motor Industry*, pp. 84 – 85.

278 Even at the height of trade union membership at Gardner, this was acknowledged by both unions and management. Shop Stewards' Minutes, 13 August 1975.

279 On the organization of union representatives at plant level see; Coates and Topham, *Trade Unions in Britain*, chap. 5, *passim*; Turner, Clack, and Roberts, *Labour Relations*, pp. 206 – 207; Dewey, *War and Progress*, p. 40; for an outline of Gardner specific organization see Arthur Walmsley interviewed by Ruth Frow and Edmund Frow, tape recording, Salford, July 1976, ref. 259A, 2000.1061; for a concise history of the CSEU see <http://www.warwick.ac.uk/services/library/mrc/ead/259CSEU.htm>.

280 Raymond Robinson interviewed by Ruth Frow and Edmund Frow, tape recording, July 1976., ref. 231A, 2000.1037.

281 Arthur Walmsley, a shop steward at Gardner for many years, recalled having good relations with Harold Hunter, the works manager, and, although the Gardner family members rarely had direct contact with trade union officials, they were prepared to intervene when negotiations reached impasse. In particular, he remembered several amicable discussions with Thomas and Eric Gardner, the then chairman and deputy chairman, during negotiations for a 'prosperity bonus' which was eventually granted to workers who were not on piecework. In contrast, in 1957, when the Shop Stewards' Committee's suggested that the introduction of an award for 'long and meritorious service' would be conducive to employee retention it was rejected by the management who thought that such a scheme would be too expensive. Arthur Walmsley, Interviewed by Edmund and Ruth Frow, tape recording, 1976, Working Class Movement Library, Archive Reference 259A, 2000.1061; Shop Stewards' Minutes, 26 June 1957.

282 Shop Stewards' Minutes, 24 August 1955; Shop Stewards' Minutes, 7 September 1955; Shop Stewards' Minutes, 7 March 1956; Shop Stewards' Minutes, 30 May 1956; Shop Stewards' Minutes, 18 September 1957; Shop Stewards' Minutes, 24 June 1959; Shop Stewards' Minutes, 14 October 1959; Shop Stewards' Minutes, 11 November 1959; Shop Stewards' Minutes, 22 October 1961; Shop Stewards' Minutes, 17 January 1962; Shop Stewards'

training and employment conditions of apprentices, who seem to have been generally regarded as a supplementary low paid workforce, were also for the most part disregarded.²⁸³ Only after the introduction of the Factories Act in 1961, with its strict rules on safety in the workplace and the employment of young persons, were these matters addressed. Even then, the 'Safety First' committee that was established following a bland declaration acknowledging safety to be of primary importance, proved little more than a talking shop. Although periodic meetings were held to discuss specific safety issues, members of the managerial staff frequently ignored the committee's recommendations, leaving employees in parts of the Barton Hall works at risk.²⁸⁴

V Findings

By the early 1960s, the consequences of the 1958 engine crisis were beginning to have a negative effect on workplace industrial relations at Gardner. The already substandard working conditions in parts of the Patricroft plant had become exacerbated by a combination of staff shortages caused when short-time working had led many employees to seek full-time work elsewhere, and a sharply increasing workload.²⁸⁵ Unsurprisingly, in view of the management's previous conduct, several requests for dilution were treated with calculated indifference, an inevitable consequence of which was an increase in the amount of overtime working. While many hourly paid workers no doubt welcomed an opportunity to increase their incomes, others, who were evidently more reluctant to give up their leisure time, began to interpret persuasion as coercion. Some of these complained, first to their shop stewards and then directly to full-time union officials, that excessive overtime had become virtually compulsory; a situation regarded by all serious trade unionists as unacceptable.²⁸⁶ Given the apparent compliant disposition of the Gardner shop stewards at that time, other than

Minutes, 23 May 1962 ; Shop Stewards' Minutes, 5 February 1963; Shop Stewards' Minutes, 29 May 1963.

283 Allegations of this type of exploitation are recorded in Shop Stewards' Minutes, 2 February 1955; Shop Stewards' Minutes, 15 June 1955; Shop Stewards' Minutes, 29 June 1955; Shop Stewards' Minutes, 7 September 1955; Shop Stewards' Minutes, 24 January 1968; Shop Stewards' Minutes, 27 August 1969.

284 Shop Stewards' Minutes, 3 January 1962; Shop Stewards' Minutes, 28 March 1962; Shop Stewards' Minutes, 25 April 1962; on the 1961 Factories Act and its implications see for example The Honourable Lord Cullen, lecture on The Development of Safety Legislation, Royal Academy of Safety Legislation and Royal Society of Edinburgh, 1996; also Factories Act 1961: 9 and 10 Eliz. 2, chapter 24 (London: HMSO, 1961).

285 Shop Stewards' Minutes, 23 July 1958; Shop Stewards' Minutes, 28 October 1958; Shop Stewards' Minutes, 7 January 1959; Shop Stewards' Minutes, 4 February 1959; Shop Stewards' Minutes, 4 March 1959; Shop Stewards' Minutes, 18 March 1959; Shop Stewards' Minutes, 1 April 1959; T. F. Farrell, Patricroft, to E. Frow, Manchester, 30 September 1964.

286 'Overtime continued to be a major evil ...', E. and R. Frow, *Engineering Struggles*, p. 226; Shop Stewards' Minutes, 23 July 1958; Shop Stewards' Minutes, 28 October 1958; Shop Stewards' Minutes, 7 January 1959; Shop Stewards' Minutes, 4 February 1959; Shop Stewards' Minutes, 4 March 1959; Shop Stewards' Minutes, 18 March 1959; Shop Stewards' Minutes, 1 April 1959; Shop Stewards' Minutes, 4th January 1961; Shop Stewards' Minutes, 22 April 1962; W. Henderson, Patricroft, to A. Bottomley, Manchester, 25 April 1961.

obstructing requests for dilution, the full-time union officials made no efforts to intervene.²⁸⁷ Thereafter, however, an already palpable rift between members of the AEU District Committee and the Gardner management steadily widened.

By 1963, the character of the shop stewards' committee at Gardner appears to have changed with the election of T. F. Farrell, a Works Convenor under whose leadership a strict limit on the amount of overtime working was placed and matters concerning the training of apprentices and health and safety were vigorously addressed. Moreover, in mid-1964, after the management had persistently rejected a claim for a general increase in wages, the Works Committee acted even more forcefully. As previously discussed, the Manchester Piecework Agreement, under which the majority of Gardner employees were paid, included the entitlement of individual workers, under certain circumstances, to renegotiate rates and declare day-work if not satisfied. By using this right collectively they could institute an effective 'go-slow' which, under such circumstances, could not be classified as industrial action and was not therefore subject to the Provisions for the Avoidance of Disputes regulations. The effectiveness of this strategy, especially when it was combined with an overtime ban, is evidenced by the result of its first recorded post-war use at Gardner. Within a month, it brought the management back to the negotiating table where a satisfactory offer was worked out. As a result, Farrell was re-elected Works Convenor in January 1965, and again in January 1966.²⁸⁸

Given the ostensibly confrontational temperament of the Gardner senior management, it was inevitable that a response would, sooner or later, materialize. Thus, in July 1966, it focused its disapproval on Farrell who, in the purported interests of production efficiency, was instructed to transfer from the department where he had been shop steward for a number of years. Although within the firm's rights to manage their business, this unusual and highly provocative action was viewed by the AEU District Secretary with suspicion.²⁸⁹ It also clearly unsettled Farrell who, despite assurances that he was free to carry on his trade union activities as normal, promptly resigned. Unable to resolve the situation at plant level, the

287 For example, when called upon by the AEU district organizer to account for complaints of excessive and compulsory overtime the then Works Convenor responded as follows: 'Every person commencing at L. Gardner is informed that overtime is worked on Tuesday and Thursday evenings and Saturday morning, and that overtime is not compulsory, but everybody is expected to work these hours of overtime, which comply with the Overtime Agreement; and they can not have people pleasing themselves when they work this overtime. The reason given for this is, it can very seriously hold up line production and cause bottlenecks further along the line'. W. Henderson, Patricroft, to E. Frow, Manchester, 21 May 1962; T. F. Farrell, Patricroft, to E. Frow, Manchester, 30 September 1964.

288 Raymond Robinson interviewed by Ruth Frow and Edmund Frow, tape recording, July 1976., ref. 231A, 2000.1037; Shop Stewards' Minutes, 22 April 1962; T. F. Farrell, Patricroft, to E. Frow, Manchester, 29 June 1964; Shop Stewards' Minutes, 29 May 1963; Shop Stewards' Minutes, 13 November 1963; Shop Stewards' Minutes, 5 February 1964; Shop Stewards' Minutes, 22 April 1964; Shop Stewards' Minutes, 24 June 1964; Shop Stewards' Minutes, 22 July 1964; Shop Stewards' Minutes, 19 August 1964.

289 Shop Stewards' Minutes, 6 July 1966; for various historical examples of 'victimization' used in the Manchester area against shop stewards and convenors during this period see Edmund and Ruth Frow, *Engineering Struggles*, pp. 314 – 364.

shop stewards turned the matter over to the AEU District Committee, which, in accordance with the Provisions for the Avoidance of Disputes, summoned a formal Works Conference.²⁹⁰ During subsequent meetings, the Gardner management remained obdurate and, without Farrell's active involvement, no further action was deemed possible.²⁹¹

Although it would be implausible to suggest that the Gardner management could somehow influence the outcome of shopfloor elections, it seems uncanny that the departure of Farrell resulted in the advent of a Works Committee with an entirely different, and far less assertive, demeanour. In January 1967, Derek Waddington, whose far more accommodating approach to workplace industrial relations promised a period of harmony and stability, replaced Farrell as Works Convenor. Within a few months of his election, he announced to the District Committee that 'a change in relations has taken place between Management and the Shop Stewards Committee'. Included in a list of positive developments he reported that the post of Labour Manager had been made obsolete and a Personnel Manager, who had already been appointed in his place, was beginning to have a positive effect on employee relations. There had, he wrote, been several improvements in working conditions in the plant as well as increased bonus earnings in a number of departments. He also anticipated that many new jobs would be created when a new machine shop for the production of large engine components came into operation at the end of the year. The only pessimistic aspect of Waddington's letter referred to an ongoing shortage of skilled personnel that should, he suggested, be eased through 'controlled dilution'. In this, he declared, he intended to 'co-operate fully' with the management as long as developments at Gardner continued to be positive. Thus, and with the help of the District Committee, he hoped to improve 'the bad name Gardners have held for so long'. Viewing the tenor of this communication with concern and the steadfastness of the majority of the employees at Gardner with misgivings, the full-time officials on the District Committee unenthusiastically accepted the new situation.²⁹²

The 1968 Foundry Dispute

No similar *detente* in workplace industrial relations took place in Gardner's two foundries, where a long history of complaints regarding faulty equipment and the general inadequacy of the ventilation system persisted. The nature of foundry work, with its attendant exposure to extreme heat, dust, sand and smoke, made it at best dirty and uncomfortable, as well as both physically and mentally demanding. Moreover, the particularly unpleasant conditions in the iron foundry, which had seen very little in the way of modernization since it was built in

290 Shop Stewards' Minutes, 20 July 1966; Shop Stewards' Minutes, 10 August 1966.

291 Shop Stewards' Minutes, 21 September 1966; Report of AEU District 11 Official, *AEU Monthly Journal*, February 1967, pp. 2, 34, p. 68.

292 D. Waddington, Patricroft, to E. Frow, Manchester, 18 August 1967; Raymond Robinson interviewed by Ruth Frow and Edmund Frow, tape recording, July 1976., ref. 231A, 2000.1037; according to one colleague, Wadding was a 'really nice bloke' who 'went [along] with the Thompstone era [which defined] good trade unionist[s] as a trade unionist[s] that did as they were told. Any sort of resistance or militancy was taboo ...' Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 24 October 2003.

1912, coupled with constant refusals by management to address grievances had led to a succession of intense and occasionally acrimonious disputes.²⁹³

Towards the end of 1967, the AUFW and AEU merged to form the Amalgamated Union of Engineering and Foundry Workers (AUEFW), potentially affording opportunities for a harmonious and co-operative relationship between the Gardner foundry shop stewards and those representing the much larger engineering section. However, although the merger led to close collaboration at the national level, in district offices and in the workplace each section retained its own officials, rules, and structures. Nevertheless, at Gardner, Waddington and the former AEU stewards attempted to integrate the foundry stewards into a single Works Committee, efforts that were, in the face of the foundrymen's dogged resolve to maintain their independence, essentially unsuccessful. Seemingly oblivious to the increasingly divisive effect of such actions, Waddington persisted, claiming at one stage during a relatively minor dispute in the foundries, that the Gardner management 'will only recognize the Works Convener [himself] who has been elected by the Joint Shop Stewards Committee'. Thereafter, as subsequent events appear to demonstrate, the rift between the two sections of the AUEFW at Gardner deepened and spread, ostensibly, to the rest of the workforce.²⁹⁴

On 23 August 1968, a moulder in the iron foundry was suspended for two-days for persistent faulty workmanship. Although the validity and the appropriateness of the sanction were not questioned, either at the time or later, the conduct of the employee's supervisor caused indignation among the foundry personnel and union officials. While his open outburst of anger and 'humiliating manner' were considered unnecessarily offensive, his refusal to allow the moulder's shop steward to be present when the suspension was administered was

293 See, for example, *Vanguard*, May 1947. ref. GB1008, Working Class Movement Library, L Gardner and Sons Collection, p.1; Shop Stewards' Minutes, 25 January 1956; Shop Stewards' Minutes, 11 November 1959; Shop Stewards' Minutes, 20 January 1960; As late as February 1968 the Gardner managers were strongly resisting calls for the installation of effective ventilation systems, Shop Stewards' Minutes, 21 February 1968; in August 1968, the AUFW foundry section district organizer reported a case of 'the misuse and bullying of apprentices by a [foundry] departmental foreman'. Report of S. Haynes, district 7 organizer, *AUFW Journal*, August 1968.

294 'It appears to me that the Foundry Workers section of the Union are taking matters into their own hands and disregarding the rules and officials of the Engineering Section', D. Waddington, Patricroft, to E. Frow, Manchester, 21 June 1968; 'The foundry Shop Steward is a member of the Works Committee, he can sit in on any engineering dispute and have a direct say in our affairs. But Mr. Frow no engineering Shop Steward can sit on a Foundry Committee or have a say in their present affairs, is this fair and democratic. Every Steward at our meeting insists that this is wrong and must be rectified immediately on firmer lines of co-operation'. D. Waddington, Patricroft, to E. Frow, Manchester, 30 August 1968; Shop Stewards' Minutes, 2 March 1968; Shop Stewards' Minutes, 15 May 1968; Shop Stewards' Minutes, 12 June 1968; Shop Stewards' Minutes, 24 July 1968; Report by F. Haynes, District 11 Secretary, *The Foundry Worker*, August 1968; Shop Stewards' Minutes, 26 June 1968; D. Waddington, Patricroft to E. Frow, Manchester, 13 July 1968; on the amalgamation of the AEU and the AUFW and the after-effects thereof see *The Foundry Worker*, 31 October 1967, 35, p. 12; also S. Hays, *The Engineering Industries* (London: Heinemann, 1972), p. 48; Edmund and Ruth Frow, *Engineering Struggles*, pp. 268 – 269.

perceived to be in clear breach of procedure.²⁹⁵ The outcome was an impromptu shop-floor meeting followed by a show of hands and a resolution for an immediate walkout by all the iron foundry workers, who were soon joined on the picket line by their aluminium foundry colleagues. The management's equally precipitous response was to inform each of the two hundred and fifty strikers by letter that if they did not return to work they would be dismissed, and accordingly, on 3 September, all were sent their cards and severance pay.²⁹⁶ Eight days later the AUEFW, blaming management intransigence for the continuing dispute, announced that the stoppage had been given official status. Confidence that the strike would soon spread to other parts of the plant, however, proved ill founded.²⁹⁷

The management remained obdurate and, with some support from the District Committee, the foundry shop stewards continued to adopt a confrontational stance. In the meantime, Waddington and other members of the Works Committee attempted to resolve the dispute through negotiation, but their efforts were frustrated by their exclusion from informal discussions between management representatives, full-time union officials, and the foundry workers. Attitudes then became polarized, with the moderate engineering section protesting that their members' views were not being represented and the foundry section claiming that the matter was their sole responsibility. Clearly backing the latter's position, the District Secretary then called on Waddington to 'black' castings on the grounds that the management had begun to replace the strikers with non-union labour. Waddington, however, procrastinated, alleging that the uncompromising attitude of the foundry stewards was causing a serious rift between the foundry workers and the rest of the employees who, for this reason, were reluctant to offer support. Again, the District Secretary, while announcing his intention to address a mass meeting of union members, urged him to stop machine operators working on 'black' castings. This time Waddington responded by organising a secret ballot among the machine shop workers who would have been directly affected by such a boycott. Perhaps unsurprisingly under the circumstances, they voted by a large majority against it and, with subsequent attempts to muster support for the foundrymen being equally unsuccessful, the strike remained confined to the foundries.²⁹⁸

295 '... a worker or group of workers shall be entitled to raise any question directly concerning them ... through the appropriate shop steward ...' 'Your Union and You: Chapters in AEU History, XII – Union Negotiations and Agreements', *AEU Monthly Journal*, July 1943, p. 178.

296 Shop Stewards' Minutes, 12 June 1968; Shop Stewards' Minutes, 4 September 1968; W. Simpson, Manchester, to J. Conway, London, 11 September 1968; 'Official Dispute at L. Gardner', AUEFW Branch Circular, September 1968; on 'bloody-minded' shop stewards, see Dunnett, *Decline*, pp. 52, 110; on 'bloody-mindedness' on the part of management or workers see Wilks, 'Institutional insularity', in Chick, *Governments*, p. 164.

297 '... it is very likely that other work people employed (at Gardner) will be involved before long'. W. Simpson, Manchester, to J. Conway, London, 11 September 1968.

298 E. Frow, Manchester, to D. Waddington, Patricroft, 12 September 1968; E. Frow, Manchester, to D. Waddington, Patricroft, 13 September 1968; Shop Stewards' Minutes, 18 September 1968; E. Frow, Manchester, to D. Waddington, Patricroft, 23 September 1968; E. Frow, Manchester, to D. Waddington, Patricroft, 26 September 1968; Circular letter from AUEFW, London, 10 October 1968; D. Waddington and T. Lightfoot, Patricroft, to J. Conway,

The ten week dispute, which remarkably seems to have alleviated some of the stress in the foundries and led to an improvement in workplace industrial relations there, ended on 4 November 1968, apparently with no significant concessions being conceded by either side. After a management precondition for the signing of new contracts of employment was discarded, the strikers returned to work with no break in service, and without incurring lost credits relating to redundancy pay or pensions. The recalcitrant moulder, the period of his suspension having, obviously by then, expired, returned to work on the same conditions.²⁹⁹

Thereafter, Waddington and his supporters made several unsuccessful efforts to bring about a more convivial relationship between the Works Committee and the management.³⁰⁰ Suggestions that workplace industrial relations would be improved through better and more open communications concerning the health of the firm were basically ignored.³⁰¹ On the rare occasions that the Gardner management chose to address the employees as a group, it did so via characteristically impersonal communiqués. One such statement, written in response to a suggestion that a productivity bonus might improve output, was couched in terms that emphasized the management's opinion that the workers' contribution to the health of the firm was insignificant. (see Appendix 4)

Nevertheless, and often in the face of severe criticism from the District Committee as well as from a growing number of less compromising shop stewards, Waddington continued his endeavours to avoid conflict.³⁰² His key strategy for averting industrial action, which had proved successful during the 1968 foundry dispute, was to circumvent the more militant factions by appealing directly to the ordinary union members in the workplace. In this way, he managed, with some justification, to disregard or overturn several directives from members of the District Committee.³⁰³ If, however, the Gardner management appreciated his

London, 17 October 1968; R. W. Wright, London, to D. Waddington, Patricroft, 28 October 1968; Shop Stewards' Minutes, 30 October 1968; *The Foundry Worker*, 11 November 1968, p. 401; Report of A. Jones, Divisional Organizer, Division 11, *AUEFW Journal*, December 1968, p. 552; Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 24 October 2003.

299 Shop Stewards' Minutes, 30 October 1968; Report of A. Jones, Divisional Organizer, Division 11, *AUEFW Journal*, December 1968, p. 552.

300 For example, when, because of increasing closures and redundancies, an embargo on all overtime was imposed by the Manchester area Shop Stewards' Combine Committee in January 1972, the Works Committee successfully claimed exemption for Gardners because they were actively recruiting personnel. Shop Stewards' Minutes, 6 January 1972; Shop Stewards' Minutes, 15 January 1972; Report by J. W. Tocher, District 11 Secretary, *AUEFW Journal*, February 1972, p. 2; on Shop Stewards' Combine Committees, see Edmund and Ruth Frow, *Engineering Struggles*, pp. 202 – 219, 259, 272, 310, 409.

301 '... the man inn the street' it was suggested by one shop steward, 'knew more about what was going on at Gardners than the employees'. Shop Stewards' Minutes, 23 September 1970.

302 For example, an attempt to democratically depose Waddington early in 1972 only narrowly failed. Shop Stewards' Minutes, 12 April 1972; Minutes of a special Manchester District Committee meeting, 14 June 1972; Raymond Robinson interviewed by Ruth Frow and Edmund Frow, tape recording, July 1976., ref. 231A, 20000.1037.

303 In February 1970 Waddington bypassed the shop stewards' committee and organized a ballot among skilled operators who voted to accept a dilutee in the department. A subsequent appeal for assistance to the District Secretary resulted in a written directive being sent to

contribution to the firm's relatively trouble-free workplace industrial relations, it did not respond encouragingly.

The Strike of 1972

In September 1972 a machine operator, who was also a shop steward, was ordered by his supervisor to transfer to a different machine. Upon learning that he was to be replaced by an apprentice, and after consulting the District Secretary, he refused to move. When, as a result, he was summarily dismissed, all sixty union members in the department concerned walked out in support. Waddington immediately attempted to intercede, but with a key section of the plant standing idle, the District Committee clearly felt strong enough to insist on a return to the *status quo anti* before any talks took place. He nevertheless approached the management, which, declining to comply with the union's demand, offered instead to discuss two compromise positions, both of which were rejected out of hand. Waddington was then directed to encourage other union members to become involved in the dispute, and to ensure as well that no work whatsoever was being carried on in the effected department. Soon, however, it became clear that these instructions were not being carried out, prompting the District Secretary to bypass the Works Committee and call the Gardner employees to a mass meeting. Although his motion for an immediate withdrawal of labour was rejected, his supplementary proposal to reconsider the situation should the management attempt to replace any of the striking machinists with non-union labour was approved.³⁰⁴

What the Gardner managers did next affectively nullified the efforts of Waddington and the moderate faction, delivered the leadership of the workforce to the militants, and spread the stoppage from a single department to the whole of the plant. Clearly miscalculating the mood of their employees, they claimed that an improvised ballot of staff in the works canteen had approved a proposal to employ non-union machinists in the strike-affected department. Upon learning of this development, the full-time district officials again assembled a mass meeting

Waddington instructing him not to process the necessary dilution forms. His reply was both curt and prompt; the forms, he stated, 'were already signed after approval of the men, previous to me receiving your instruction'. In March 1972, in response to the management's rejection of a pay claim, the district organizer assumed personal control and placed the matter before the employees at two mass-meetings, the second of which voted to petition the Gardner management to resume negotiations within seven days. They responded through a firm of solicitors, who threatened to initiate legal proceedings under Sections 96 and 101 of the Industrial Relations Act. This was ignored creating a deadlock. With the support of some of the more moderate shop stewards, Waddington again organized a ballot of Gardner workers, the result of which suggested that most of them were satisfied with the company's offer. When the District Committee asked to have these findings confirmed at a mass meeting, Waddington refused, announcing that, based on an improved offer from the management, he would lift the ban on piecework and overtime forthwith. Further communications and instructions from the District Committee were more or less ignored, and production at Patricroft returned to normal. Shop Stewards' Minutes, 15 March 1972; Shop Stewards' Minutes, 29 March 1972; Shop Stewards' Minutes, 12 April 1972; Minutes of the Manchester District Committee Meeting, AUEW, 25 April 1972; Shop Stewards' Minutes, 26 April 1972; Shop Stewards' Minutes, 12 May 1972; *AUEFW Journal*, May 1972, p. 224; D. Waddington, Patricroft to E. Frow, Manchester, 24 February 1970.

304 Minutes of a special meeting of the Manchester District Committee, 19 September 1972; Shop Stewards' Minutes, 20 September 1972; Minutes of an inquiry into the conduct of D. Waddington and various Shop Stewards, 5 October 1972.

and called on all union members to observe their previous resolution. The result, predictably, was that at midday on 23 October 1972 they complied and within a few days all hourly paid Gardner employees had either joined the strike or been laid off as a result of it. 'The whole works has been shut down because of the dispute' William Gordon Thompstone, the works director, told the local press, 'and about 2,500 of the 2,800 workforce are affected'.³⁰⁵

An appeal for support to the Manchester Shop Stewards' Combined Committee virtually ensured that the strike would hold firm. In the face of an embargo on all work connected with Gardner, and a resolution to hold demonstrations and summon mass pickets, the management decided to negotiate. In what amounted to a complete capitulation, they undertook to reinstate the shop steward, not to victimize him, and to pay him for holidays lost during the strike. They also formally guaranteed that they would not in future attempt to replace skilled workers with apprentices. On these terms, while resolving to strengthen their organization at Patricroft in the near future, the union agreed to recommend a return to work.³⁰⁶

In the meantime, attention had focused on Waddington and several other shop stewards who, in the opinion of the District Secretary, had not demonstrated appropriate support for members involved in the early stages of the dispute. Summoned to a meeting at the AUEW's Manchester office, they were asked to account for their alleged misconduct.³⁰⁷ After imposing nominal fines for ignoring a previous summons, the committee proceeded to consider more serious matters. It was subsequently found that Waddington and others had failed to carry out the decisions of the Manchester District Committee and misled union members regarding rules and procedures. Abrogating Waddington's shop stewards credentials forthwith, the committee reprimanded the others and warned them as to their future conduct.³⁰⁸

Although the 1972 dispute represented a comprehensive reversal for the Gardner management's attempt to impose strict discipline in the workplace, it did not, as might be

305 Report of the District Organizer, AUEW, 10 October 1972; Shop Stewards' Minutes, 24 October 1972; Minutes of a Special District Committee Meeting, 26 October 1972; 'Gardners men go on strike', *Eccles and Patricroft Journal*, 26 October 1972, p. 1; Minutes of a Special District Committee Meeting, 31 October 1972.

306 Minutes of a Special Shop Stewards Meeting, 26 October 1972; Shop Stewards' Minutes, 8 November 1972; Report of J. W. Tocher, District 11 Organizer, *AUEW Journal*, December 1972, 39, 12, p. 566.

307 The Amalgamated Union of Engineering Workers (AUEW) was formed in 1970 as a result of a merger between the Amalgamated Union of Engineering and Foundry Workers (AUEFW), the Draughtsmen and Allied Technicians Association (DATA) and the Constructional Engineering Union (CEU).

308 Minutes of an inquiry into why Brothers Waddington and Lightfoot and all other AUEFW (Engineering Section) Shop Stewards, with the exception of Brothers Bushell, Ankers and Robinson, should not be disciplined in accordance with Rule 13 for failing to attend the District Committee when summoned in accordance with that Rule on Tuesday 26 September 1972, 5 October 1972; Minutes of an inquiry into the conduct of D. Waddington and various Shop Stewards, 5 October 1972; Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 24 October 2003.

expected, lead to a more astute approach to employee relations.³⁰⁹ Nor, surprisingly, did the sanctions imposed on Waddington and other former shop stewards deter them from involving themselves in union affairs; issues that, within a few weeks, had combined with the equally strong determination of the more militant trade unionists and their leaders to produce the devastating events of the first six months of 1973.

The Strike of 1973

The 1973 dispute began with a demand for a general rise in wages, which, in an attempt to circumvent the limitations imposed by the prevailing freeze on incomes and prices, was couched in terms of an increase in the existing production bonus.³¹⁰ When negotiations with the management failed to produce an acceptable offer, the Works Committee called a mass meeting of the workforce and asked for a declaration of day-work under the terms of the Manchester Piecework Agreement.³¹¹ However, with the active support of some of the moderate shop stewards, several departments continued to work normally, thus rendering the embargo partially ineffective.³¹² Seemingly encouraged by this lack of unity, the Gardner management then offered to draft an improved bonus scheme on condition that all employees returned to normal working.³¹³ The union responded negatively, tempering their rejection, however, with an offer to include the Engineering Employers Association in a three-way conference. The management's riposte was to withdraw from all discussions, stating that it would not negotiate 'under duress'.³¹⁴

Almost inevitably, this situation soon led to an escalation of the dispute and, two weeks later, all efforts to draw the management back into negotiations having failed, the union added an overtime ban to the piecework embargo.³¹⁵ Again displaying a predilection for rash and illogical action, on 15 March 1973, the Gardner management responded by posting the following curt and unambiguous notice throughout the plant:

309 Minutes of a Special District Committee Meeting, 17 October 1972; Minutes of a Special District Committee meeting, 23 January 1973.

310 Shop Stewards' Minutes, 24 January 1973; In November 1972, the government announced a statutory three-months freeze on wages and prices which would last until April 1973, when increases limited to £1 plus four per cent a week, up to an annual maximum of £250 would be permitted, see Cairncross, 'Economic policy', pp. 79 – 80; Schulze and Woodward, 'Rapid Inflation', in Coopey and Woodward, *Britain in the 1970s*, p. 112; Chris Wrigley, 'Trade Unions, Strikes and the Government', in Coopey and Woodward, *Britain in the 1970s*, p. 285; Cairncross, *British Economy*, Second Edition, p. 198.

311 Monthly Report of the District 11 Secretary, *AUEW Journal*, 30 January 1973; Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 24 October 2003.

312 Minutes of a Special District Committee meeting, 23 January 1973; Shop Stewards' Minutes, 6 February 1973.

313 Shop Stewards' Minutes, 6 February 1973.

314 Joint Shop Stewards' Minutes, 21 February 1973.

315 Shop Stewards' Minutes, 7 March 1973.

As from tomorrow, Friday, 16 March, all employees banning piecework or taking irregular industrial action, or acting in sympathy therewith will be laid off until further notice. Employees working normally will be laid off for two working days each week until further notice. Anyone required to work a full week will be notified individually. The none-working days next week will be Monday, 19 March, and Tuesday, 20 March.³¹⁶

To all intents and purposes, for those workers in the parts of the Patricroft plant that were working more-or-less normally, this stratagem amounted to a lockout. Its affect on the workforce, especially those whose reward for defying union instructions was to have their employment reduced to three days a week, was predictable. Consequently, a motion to take all-out strike action placed before a mass meeting of employees on 19 March 1973 was carried by a large majority, and when an exasperated AUEW official described the events that had brought about the closure of Gardner as 'the worst case of bad management I have seen for a long time', few would have disagreed.³¹⁷

As the deadlock continued, the mood of the strikers became confrontational. Pickets, who blocked the street outside the despatch department, later entered the works and occupied various departments in an organized 'sit-in'. When management called in the police, they took no action, stating that the public highway was not being blocked and that the demonstration was peaceful. By early May, on prearranged evenings, hundreds of workers from engineering firms in the Manchester area were joining the Gardner pickets, jostling and jeering as 'black-legs', protected by a cordon of police officers, entered and left the plant. Further escalations were threatened when union officials demanded the support of 'the whole of the trade union movement', calling for 'ten thousand men' to buttress the blockade.³¹⁸

As both sides remained obdurate and the dispute wore on it began to impact on other firms, especially Gardner's automotive industry customers, who relied on Patricroft to supply engines for many of the vehicles they built. Consequently, firms like Foden of Sandbach and the bus builder Bristol Commercial Vehicle (BCV), both experiencing difficulties, began to urge customers to accept alternatives. The potentially damaging long-term effects of these and, doubtless, other similar developments on the HCV sector attracted the attention of MPs and government departments, but their appeals made little impression. Preliminary talks held at the Manchester headquarters of the Employers' Association produced no basis for a return to work and no date was set for a second meeting.³¹⁹

316 Shop Stewards' Minutes, 15 March 1973.

317 Minutes of the AUEW Manchester District Committee meeting, 20 March 1973; 'Gardners men go on strike', *The Salford Journal*, 22 March 1973, p. 2.

318 'Sit-in at factory', *Eccles and Patricroft Journal*, 5 April 1973, p. 4; 'Gardners cars blocked', *Eccles and Patricroft Journal*, 3 May 1973, p. 4; Barbara C. Holman, Murcia, Spain, to Maurice Halton, Horwich, 13 March 2004.

319 Tony Benn MP, London, to Alan Stiddard, Bristol, 3 May 1973; Minutes of a Special Summons Meeting of Shop Stewards, 10 May 1973; 'Engineers are still sitting in', *Eccles and*

Meanwhile, issues relating to the conduct of various former members of the Gardner Works Committee came before the District Committee. At an enquiry held on 17 May 1973 at the Manchester office of the AUEW, Derek Waddington's appeal against the withdrawal of his shop stewards credentials was rejected. At the same time a new allegation, that of pursuing antiunion activities during an official dispute, had been made against him. When several witnesses affirmed that he had crossed the picket line and engaged in discussions with management representatives during the current strike, the committee ruled that he was '... not a fit and proper member to hold shop stewards credentials ..'. Fined 'the maximum under the Rule', he was issued with a severe reprimand and warned that similar conduct in the future could well result in his expulsion from the union. At another special District Committee meeting held a few days later, similar allegations were examined against T. Lightfoot, who had been Chairman of the Works Committee at the time Waddington was Convenor. Finding that he had broken union rules on a number of occasions, the committee withdrew his shop stewards credentials.³²⁰

It seems likely that, with the leaders of the moderate faction thus neutralized, the Gardner management resolved to end the dispute on the best terms available under the circumstances. The first sign of an slackening of its heretofore-intractable position came in late May. In an interview given by John Kynaston Gardner, the Joint Managing Director, to the *Eccles and Patricroft Journal*, it was disclosed that the company was prepared to make an improved offer subject to approval by the Pay Board.³²¹ Three weeks later, following a series of meetings, a settlement based on this proposal was reached and, on 18 June 1973, after the Barton Hall works had been virtually closed for fourteen weeks, Gardner resumed normal working.³²²

Unsurprisingly, the dispute had immediate and harmful effects, among the most damaging of which was the permanent loss of between 500 and 600 highly skilled craftsmen and a fifty per cent fall in engine production.³²³ In a recurrence of the conditions that followed the strike of 1972, a combination of staff shortages and a backlog in deliveries generated requests for excessive overtime in several departments, leading some employees to complain to their shop stewards that they were being pressured into working more hours than they wished.³²⁴ Considering that these and other relatively minor issues should be resolved before they

Patricroft Journal, 12 April 1973, p. 4; 'Work situation may get worse at BCV', *Bristol Evening Post*, 8 May 1973, p. 43.

320 Minutes of a Special District Committee Meeting, 17 May 1973; Minutes of a Special District Committee Meeting, 22 May 1973.

321 'No date fixed for second strike meeting', *Eccles and Patricroft Journal*, 31 May 1973, p. 4.

322 Minutes of the Manchester District Committee of the AUEW, Divisional and Assistant Divisional Organizers' Report, 12 June 1973; 'Everyone back at Gardners', *Eccles and Patricroft Journal*, 21 June 1973, p. 5.

323 Staff Reporter, 'Staff Crisis at strike-hit plant', *Manchester Evening News*, 18 June 1973; Edge, *Legendary Engineering*, pp. 205 – 206.

324 Shop Stewards' Minutes, 5 August 1973; Shop Stewards' Minutes, 22 August 1973.

escalated, the new Works Committee requested a conference with one or more of the Gardner family directors. They, however, demurred, myopically stating that they 'could see no useful purpose in such a meeting taking place' and workplace industrial relations remained somewhat tense³²⁵

The End of the Family Firm

The medium-term consequences were also profound. As well as signalling the end of Gardner as a family firm, the failure of the management's efforts to establish a high level of coercive discipline in the workplace ushered in an increase in trade union membership until, by the end of 1974, it encompassed virtually the whole of the workforce. Thereafter, every department in the works was represented by a shop steward, whose committees were larger and far more assertive than ever before. Minutes of their meetings, often openly critical of the management, were reproduced and posted on notice boards throughout the factory. Surprisingly, however, there is little evidence to suggest that this new situation proved detrimental to the organization and efficiency of production. Indeed, it seems apparent that during the remaining few months of Gardner family control, when problems with the firm's customers and suppliers regularly caused disruptions, the shop stewards adopted an increasingly accommodating and flexible approach.³²⁶

Nevertheless, 1974 was characterized by the absence of overtime, traditionally systemic at Gardner, and by short time working in several departments. By January 1975, however, although difficulties persisted, order intake was described as 'good' and there were expectations, unfounded in reality, that the general situation would soon improve. Continuing problems with suppliers were exacerbated when some of Gardner's customers, themselves experiencing difficulties, started to postpone engine deliveries. Consequently, there was a general shortage of work in the plant, with the workload in the foundries being described as 'extremely thin'. Coupled with these uncertainties, by the end of April 1975 unconfirmed rumours were circulating that major changes at Gardner were imminent.³²⁷

Interregnum

The extent of the changes, when they came, surprised many in that they profoundly

325 Shop Stewards' Minutes, 19 September 1973; 'After the 1973 dispute, the Gardners were seen less and less on the shopfloor...', Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 11 March 2004.

326 For example, In March 1974 Seddon Atkinson went on strike over wage controls imposed by government anti-inflation legislation. Press Cutting, *Oldham Evening Chronicle*, ref. V35-P70, Oldham Local History Library archive; Shop Stewards' Minutes, 26 June 1974; Shop Stewards' Minutes, 24 July 1974; Shop Stewards' Minutes, 3 September 1974; Shop Stewards' Minutes, 16 October 1974.

327 For an illustration of the long-standing issue of 'excessive' overtime at Gardner see Report of the Division 11 Organizer *AEU Monthly Journal*, September 1954, p. 284; Shop Stewards' Minutes, 3 September 1974; Shop Stewards' Minutes, 13 November 1974; Shop Stewards' Minutes, 30 October 1974; Shop Stewards' Minutes, 11 December 1974; Joint Shop Stewards' Minutes, 8 January 1975; Shop Stewards' Minutes, 2 April 1975; Shop Stewards' Minutes, 12 April 1975; Shop Stewards' Minutes, 16 April 1975; Shop Stewards' Minutes, 30 April 1975; L. Tolly, *The Times business section*, 31 December 1976; also *Foden An Outline History, passim*.

transformed the make-up of the regime that had controlled Gardner for the previous twenty years. On 1 July 1975, Joseph Hugh Stott Gardner, at the age of 71, stepped down as Chairman of the Board. On the same day, Eric Anthony Todd, aged 72, also resigned, followed in September by the Works Director, William Gordon Thompstone, aged 66, and the Company Secretary, Frank Gardner Wilkinson, aged 67. While two family members – John Kynaston Gardner, as Managing Director, and his son, John Paul Gardner, as Technical Director – remained, George Norman Clayton Flint, the first ever member of the board with executive powers who was not a Gardner family member, replaced Hugh as Chairman. Born in Wisbech, Cambridgeshire in 1914, Flint studied law at Clare College, Cambridge gaining a BA in 1936, an LLB in 1937, and an MA in 1940. Another significant change was the elevation of Geoff Howarth, the personnel manager, to the board of directors.³²⁸

These fundamental alterations to the firm's administration brought with them an equally radical shift in the management's approach to workplace industrial relations. Acknowledging a need to reach better understandings in the future, one of Clayton Flint's first actions was to meet with the Joint Shop Stewards Committee to discuss the firm's relationship with its employees.³²⁹ Overall, however, the news he delivered was sombre. A downturn in business had forced the management to suspend recruitment, and they would need to introduce short time working in most areas of the plant.³³⁰ In addition, from 1 January 1976, all employees reaching retirement age, and at Gardner there were many, would be compelled to resign.³³¹ While these announcements, especially the latter, appear to have been viewed as reasonable responses to prevailing circumstances, a delay in the implementation of a recently negotiated wage increase was considered unacceptable, and the 'immediate position of the company' notwithstanding, the shop stewards promptly registered a formal failure to agree.³³²

Nevertheless, and in stark contrast with the previous regime, reticence and secrecy were replaced by a constant flow of information from the boardroom, via the shop stewards, to the workplace. Having first identified the problems the firm was facing, and allowing sufficient time for their severity to be absorbed, Flint began to outline the measures he was taking to remedy them. Advertising was being increased, and the sales department had been instructed to seek new customers and accept orders in 'any form'. A new range of engines

328 L. Gardner and Sons Limited, *Report and Accounts for the year ended 31 December 1975 to be presented at The Seventy-sixth Annual General Meeting, of the Company on 13 May 1976*, pp. 4 – 5; Cambridge Alumni Relations Office (CARO), 1 Quayside, Bridge Street, Cambridge.

329 Joint Shop Stewards' Minutes, 2 July 1975.

330 '1300 go on four-day week', *Eccles and Patricroft Journal*, 26 November 1975, p. 1; Joint Shop Stewards' Minutes, 8 October 1975.

331 'Employees retire', *Eccles and Patricroft Journal*, 7 January 1976, p. 17; Joint Shop Stewards' Minutes, 10 September 1975.

332 Joint Shop Stewards' Minutes, 13 August 1975; Joint Shop Stewards' Minutes, 19 November 1975.

was already in the early stages of design and would soon be introduced. Efforts to increase the workload included a reduction in the number of components supplied by outside sub-contactors, and the employment of Gardner staff in much-needed machine tool refurbishment programmes. There were also urgent plans to improve working conditions in the foundries where, with the help of government grants, modern equipment would soon be installed.³³³

By the end of 1975, Gardner's trading position had recovered sufficiently to allow the new management to re-establish full-time working. By mid-February 1976, the situation had improved further, and the firm began a recruitment drive to restore the number of employees to pre-1973 levels.³³⁴ Cautiously welcoming these positive developments, the Works Committee warned against any resumption of systematic overtime working, and called for investment in modern, more efficient equipment, and for management to 'analyse and plan in order to avoid short working hours' in the future.³³⁵

During the next eighteen months, under Clayton Flint's stewardship, Gardner's trading position improved considerably. The new approach to sales and marketing resulted in an increase in engine output to an unprecedented 150 units per week, the erection of a new machine shop equipped with modern machine tools, and to a significant expansion in the number of employees; positive developments that transformed the firm's relationship with its workforce.³³⁶ In particular, it is clear that Flint's personal popularity transcended the deep-seated scepticism of hardened trade unionists, so much so that, within a few months of his appointment, normally cynical shop stewards were referring to him as 'our enlightened Chairman' and to his administration as 'our new enlightened board of directors'.³³⁷

There can be no doubt that Clayton Flint's evident ability to captivate others and his readiness to communicate were of considerable value in his dealings with the Gardner

333 Joint Shop Stewards' Minutes, 3 December 1975.

334 'Gardner at Start of Boom?', *Eccles and Patricroft Journal*, 31 March 1976, p. 1; 'Boost on Jobs Front', *Eccles and Patricroft Journal*, 16 June 1976, p. 1; Joint Shop Stewards' Minutes, 30 December 1975.

335 Joint Shop Stewards' Minutes, 14 January 1976; Joint Shop Stewards' Minutes, 28 January 1976; Joint Shop Stewards' Minutes, 11 February 1976; Joint Shop Stewards' Minutes, 25 February 1976; Joint Shop Stewards' Minutes, 24 March 1976; Joint Shop Stewards' Minutes, 2 May 1976; Joint Shop Stewards' Minutes, 11 June 1976; Joint Shop Stewards' Minutes, 25 June 1976.

336 Announced in mid-1976, the machine shop was in full production by December. By then the workforce had increased by 300, bringing the number of shopfloor personnel to 1,975. Joint Shop Stewards' Minutes, 9 July 1976; Joint Shop Stewards' Minutes, 23 July 1976; Joint Shop Stewards' Minutes, 17 September 1976; Joint Shop Stewards' Minutes, 22 October 1976; Joint Shop Stewards' Minutes, 3 December 1976; Joint Shop Stewards' Minutes, 17 December 1976.

337 Joint Shop Stewards' Minutes, 14 January 1976; Joint Shop Stewards' Minutes, 28 January 1976; Joint Shop Stewards' Minutes, 11 February 1976; Joint Shop Stewards' Minutes, 25 February 1976; Joint Shop Stewards' Minutes, 10 March 1976. Paul Gardner, Salford, to Maurice Halton, Horwich, 13 August 2003.

workforce and their union representatives.³³⁸ It is clear, however, that workplace harmony was not purchased with compliance. While the union's efforts to make the Patricroft plant a 'closed shop' were persistently resisted, and several 'failures to agree' over this issue were registered, at no time was industrial action threatened.³³⁹ On three occasions between July 1975 and the end of 1977, the Shop Stewards Committee submitted claims for substantial wage increases, none of which were met either timeously or in full. Although they were able to refer to government restrictions and, on one occasion, the threat of sanctions by the Department of Employment, the Gardner management under Flint took care never to withdraw from negotiations.³⁴⁰ Nor, during Flint's relatively brief period at Gardner, were there any declarations of day-work, overtime bans, or other organized stoppages of work. Moreover, when a group of employees downed-tools, they were rebuked by the Shop Stewards' Committee who described their action, the only incident of its kind recorded during this period, as 'deplorable'.³⁴¹

As Gardner engines increasingly became the preferred power unit for a growing number of vehicle builders and operators, order intake gathered momentum. Recruitment and staff turnover, however, remained challenging. In some sections of the plant enrolment barely kept pace with resignations, and shortages in some trades exacerbated the firm's considerable skilled labour problems, leading inevitably to a recurrence of the long-standing issue of excessive overtime. Nevertheless, with the record profits generated in 1976 set to rise even further in 1977, Flint delivered a positive and optimistic address to the annual meeting of Gardner shareholders. 'We are', he coyly suggested, 'doing quite well'. He also mentioned, parenthetically, that conversations had taken place with the National Economic Development Office in conjunction with Rolls-Royce Motor Holdings.³⁴²

338 As clearly illustrated in G. N. C. Flint, Salford, to John W. Tocher, Manchester, 9 February 1976; and in John W. Tocher, Manchester, to G. N. C. Flint, Salford 26 February 1976.

339 Although, in February 1977, negotiations between representatives of the Employers Association and the Confederation of Shipbuilding and Engineering Unions resulted in a draft agreement on this issue, it was never implemented. see Shop Stewards' Minutes, 23 April 1976; Works Committee Shop Stewards' Minutes, 7 May 1976; J. Bamber, Manchester, to J. W. Tocher, Manchester, 14 May 1976; J. Bamber, Manchester, to J. W. Tocher, Manchester, 24 November 1976; J. Bamber, Manchester, to J. W. Tocher, Manchester, 2 February 1977.

340 For example, a claim for a general increase in wages, submitted and accepted in July 1975, was not fully implemented for several months. A more substantial award in July 1976, which the management responded to favourably, was modified and delayed by the criteria of the Social Contract. A third considerable increase, approved in July 1977, was reversed when the threat of sanctions by the Department of Employment jeopardized the health of the firm. Joint Shop Stewards' Minutes, 10 March 1976; Paul Gardner, Salford to Maurice Halton, Horwich, 13 August 2003; Joint Shop Stewards' Minutes, 23 July 1976; Joint Shop Stewards' Minutes, 28 January 1977; Joint Shop Stewards' Minutes, 25 February 1977; Joint Shop Stewards' Minutes, 25 March 1977; Report of the District 11 Organizer, *AEU Monthly Journal*, September 1977, pp. 42 - 43.

341 Joint Shop Stewards' Minutes, 15 July 1975.

342 Joint Shop Stewards' Minutes, 28 January 1977; Joint Shop Stewards' Minutes, 31 March 1977; Michael Rimmer, 'Gardner hits the jackpot', *Manchester Evening News*, April 28 1977.

The Hawker Siddeley Takeover

By June 1977, Rolls-Royce had acquired a 16.72 per cent shareholding in Gardner, a situation that sections of the press began to construe as the early stages of a bid to gain full control. Clayton Flint firmly dismissed such speculations, emphasizing that the Gardner board was confident in the firm's ability to take full advantage of its current success. However, his reflection that he was 'properly ready to listen to any proposals' indicated clearly that appropriate offers would not be discarded without due consideration.³⁴³ Accordingly, in early July, cash-rich following the nationalization of its aerospace divisions, Hawker Siddeley revealed itself as a potential suitor and soon became the preferred bidder. A few days later, following formal discussions, it was announced that Hawker Siddeley's offer, which valued the firm at £14.7 million, would be recommended for acceptance by the Gardner board of directors.³⁴⁴

There was, of course, never any question that the firm's employees would be consulted at any stage or on any aspect of these proceedings. However, assurances were given that no redundancies would result from the acquisition, and that Gardner would continue to operate as an independent unit. Moreover, the advantages of the Hawker Siddeley Group, including its '... financial strength, production experience and world wide export organization ...' would, it was asserted, complement Gardner's '... reputation for engines of the highest quality with outstanding fuel economy, reliability and longevity'. On 31 December 1977, when Gardner officially became a wholly owned subsidiary of Hawker Siddeley Group, George Norman Clayton Flint, the last Chairman of the Gardner Board, resigned.³⁴⁵

VI Analysis

The evidence presented above suggests that by 1960, the paternalistic 'cash nexus' convention that had, ostensibly, characterized the relationship between Gardner and its employees since the end of the Second World War had subtly changed. Progressively adopting a coercive-cum-remunerative approach, the management increasingly relied on the financial incentives offered by a PBR system coupled with a high level of subordination in the workplace to enforce the wage-effort bargain.³⁴⁶ However, while monetary rewards produced a limited degree of loyalty, the management's authoritarianism and unsympathetic attitudes to workers' legitimate concerns regarding safety and comfort in the workplace inevitably invoked a correspondingly negative response.

343 'Rolls-Royce takeover?', *Eccles and Patricroft Journal*, 23 June 1977, p. 1; Barbara Conway, 'Hawker in talks with Gardner', *Daily Telegraph*, 12 July 1977; Terry Dodsworth, 'Hawker may bid for Gardner', *Financial Times*, 12 July 1977; 'Takeover race looms for diesel group', *Daily Express*, 12 July 1977; Nicholas Bannister, 'Hawker may bid for diesel group', *The Guardian*, 12 July 1977; 'Take-Over At Gardners?', *Eccles and Patricroft Journal*, 21 July 1977, p. 1.

344 'Take-Over At Gardners?', *Eccles and Patricroft Journal*, 21 July 1977, p. 1; 'Hawker upstages Rolls-Royce Motors', *The Times*, 23 December 1977.

345 Edge, *Legendary Engineering*, p. 184.

346 On the existence this type of regime see Howard F. Gospel and Gill Palmer, *British Industrial Relations*, Second Edition (London: Routledge, 1993), pp. 42 – 43; Amitai Etzioni, *A Comparative Analysis of Complex Organizations* (New York: Free Press, 1961), pp. 3 – 39.

Nevertheless, disapproval was slow to develop into widespread and active dissension and, for most of the 1960s, the largely compliant Gardner workforce represented by moderate shop stewards afforded comparatively stable workplace industrial relations. Thus, between 1960 and 1966, other than three brief and minor stoppages, no serious disputes occurred, and at least one potentially grave incident involving the harassment of a trade union official passed almost without incident. Moreover, with the election of a particularly moderate Works Convenor in January 1967, the shop stewards' committee assumed an even more conciliatory disposition. As well as rejecting the confrontational policies of more militant shop stewards, forestalling industrial action, and circumventing the hard-line approach advocated by full-time union officials, they endeavoured to create a constructive dialogue with management.

The management, however, while persistently demanding strict adherence to rules in matters of workplace discipline, remained aloof, both from the firm's employees and from their democratically elected representatives. On two occasions, in September 1972 and again a few months later in 1973, seemingly unaware of the potentially provocative consequences of their actions, managers acted against convention and in breach of procedures. In the face of increasingly intense intervention by full-time union officials and mounting resentment among the workforce, the moderate shop stewards' conciliatory approach proved ineffective.

Thus, in 1972, a relatively minor incident deteriorated into a major conflict that subsequently involved the whole plant and ended only when the management guaranteed future adherence to the terms of long established agreements. It is clear, however, that this setback did not lead to a more adroit and less precipitous approach to workplace industrial affairs. A few months later, a less than fully supported ban on piecework and overtime in connection with a pay claim escalated into an all-out strike when the management effectively locked out the whole of the workforce. Increasingly acrimonious and confrontational, this prolonged dispute, which ended on terms more-or-less dictated by the unions, presaged the end of Gardner as a family firm.

In mid-1975, non-Gardner family directors replaced four senior members of the board, including the chairman. Almost immediately thereafter, a direct rapport with trade union representatives and, through them, with the rest of the workforce was established. Periodic announcements regarding the state of the business, although they were not always optimistic, and regular meetings between managers and shop stewards clearly had a positive effect on workplace industrial relations. Although efforts to increase wages and improve employment conditions continued, and several formal failures to agree were recorded, no strikes or partial stoppages of work took place during the next two years.

If the takeover of Gardner by Hawker Siddeley at the end of 1977 obfuscates its motives, there can be no doubt that the new management's industrial relations strategy created the

conditions in which other aspects of the business could flourish. Moreover, the speed with which the transformation was accomplished demonstrates that harmonious industrial relations at Gardner were not difficult to establish by managers who were willing to structure an environment conducive to their development.

The next chapter recounts the last seven years of Gardner as a viable industrial firm. The events described took place during a period of virtually unprecedented change in the structure of the British economy when many long established manufacturing engineering enterprises simply vanished from the environment. It will be shown, however, that in the case of Gardner, no such outcome was determined by circumstances other than those created internally.

CHAPTER 5

MANUFACTURING ENGINEERING TECHNOLOGY

I Introduction

Now you might think that Toyota Motor Company is just a company wearing a smart suit, and you want to buy such a suit for your company. However, if you only buy the kanban system, you soon discover that this suit will not fit your obese, fat body and chaos soon results.³⁴⁷

The theme propounded in this chapter is that after 1978, the new Hawker Siddeley appointed management of L. Gardner and Sons fundamentally altered the way the firm manufactured diesel engines, and thereby lost the ability to meet the needs and wants of its customers and to respond to market change. Its wider purpose is to examine the computer controlled, technologically advanced, manufacturing systems and alternative approaches to the production of complex mechanisms that were espoused by firms in the British manufacturing engineering industry during the late 1970s and the early 1980s from the perspective of a subsidiary of a multinational engineering group. The research focused on what was essentially the final seven years of Gardner's existence, concentrating on the efficacy and appropriateness of investments made in new plant and machinery, and changes made in the firm's traditional methods in relation to the production task. The analysis centres on the motivation, both explicit and implicit, behind the introduction of these changes, and their observable effects on Gardner's commercial viability in the face of increasing competition in the challenging post-1979 macroenvironmental conditions. Particular consideration was given to a series of strategic adjustments made by the new management in response to an observable and continuous deterioration in Gardner's trading position after 1980, and their ostensible contribution to Hawker Siddeley's decision to dispose of the firm in 1986.

As previously discussed, Gardner's approach to manufacturing was based on a combination of flexibility and automation and the use of conventional and modern equipment, including a small number of individual NC and CNC machine tools that had been installed before 1978. Although some proprietary components were purchased from specialist suppliers, Gardner had always been wary of outsourcing individual parts, and what little of that tradition had been allowed to lapse had been clawed back by Clayton Flint. Using this system, Gardner had profitably produced and sold around 130 complete diesel engines of various types and sizes every week during 1977. By the end of 1985, notwithstanding a considerable investment in new plant and machinery, the firm was struggling to manufacture sufficient engines to meet sales of barely a third of this number, its annual trading surpluses had become deficits, and its long-established reputation for high-quality, reliability and economy had been lost. While macroenvironmental changes may account for many of the difficulties

347 Shigeo Shingo (1909 -1990), quoted in Black, *Factory with a Future*, p. 157.

experienced by Gardner during this period, the evidence revealed by the research strongly indicates that the fundamental reasons for the firm's problems lay less in declining markets than in its ability to efficiently and profitably manufacture diesel engines. The following narrative describes how the new Gardner management's attempt to improve what it perceived as the firm's outdated approach to the production engineering task inevitably resulted in complete failure.

II Thematic Issues

The evolution of manufacturing engineering technology during the first half of the twentieth century, especially where the development of machine tools influenced the production of internal combustion engines, has already been considered above. It was shown that high-production systems like in-line transfer machines were extremely inflexible and therefore of little interest to Gardner, whose product mix, although specialized, necessitated a relatively high level of adaptability. Thus, Gardner continued to utilize a combination of standard, semi-automatic, automatic and special-purpose machine tools, manned by a blend of skilled, semiskilled and unskilled operators.

By the end of the 1950s, however, an entirely new kind of automation system, offering previously unimagined levels of flexibility and efficiency, was being applied to machine tools. The main advantages of Numerical Control (NC) were derived from its programmable electronic system, which controlled the cutting tool in relation to the component via a programme expressed as a series of numbers.³⁴⁸ The system could also execute coordinated machine movements, initiate changes to speeds and feeds, and carry out many other functions usually performed by a skilled operator. Because NC machines used standard cutting tools, and the programmes for different components could be stored as a series of coded instructions on magnetic or punched paper tapes, they were relatively easy to reset. Ostensibly, for these reasons, NC was extolled by machine tool builders and in the engineering industry press as the solution to many of the problems inherent in the manufacture of small batches of complex components and mechanisms. Overstated notions that the advent of NC represented '... the most important single advance in the whole history of the machine tool industry, and one that is much more revolutionary, for instance, than the introduction of the automatic transfer machine' were not uncommon.³⁴⁹

348 David Gibbs, *An Introduction to CNC Machining* (Eastbourne: Cassell, 1984), p. 1; Black, *Factory with a Future*, p. 37; also Bo Carlsson, 'The development and use of machine tools in historical perspective', *Journal of Economic Behaviour and Organization*, 5 (1), 1984, pp. 91 – 114; Jeffrey H. Keefe 'Numerically Controlled Machine Tools and Worker Skills', *Industrial and Labor Relations Review*, 44 (3), April 1991, pp. 503-519; editorial, 'Gaining control over machine tools', *American Machinist*, 8 January 1988, <http://www.americanmachinist.com/304/Issue/Article/False/9149/Issue>.

349 'It (the NC machine) is a highly versatile machine which is designed to carry out, entirely automatically, work that would otherwise demand the constant attendance and attention of a highly skilled operator'. 'The Extending Application of Numerical Control' (editorial), *Machinery*, August 10 1960, p. 303; 'The advent of numerical control ... has brought automation within the reach of smaller companies, where the work is non-repetitive. On numerically controlled machines it may be profitable to produce only one piece of a

Towards the end of the 1960s, the introduction of Computer Numerical Control (CNC) generated a new wave of enthusiastic, often irresponsible, outpourings.³⁵⁰ However, there can be no doubt that CNC delivered the flexibility that NC had only promised and by the mid-1970s, it had begun to alter, if not exactly transform, the ways in which firms approached the manufacture of complex mechanisms.³⁵¹ One of its significant advantages over NC derived from the memory integrated into the small computer that formed the core of its control system in which programmes could be stored and optimized at the machine. While for some this facility returned a degree of human intervention to the machining process, for others it created possibilities for communication between machines and computers, theoretically affording management an unprecedented level of control.³⁵²

III Macroenvironmental Background

According to a number of historians, the process of the 'deindustrialization' of Britain's economy began during the early 1970s.³⁵³ At the time, the government viewed it as an

complicated design at a given time'. 'Economies Obtained with Numerical Control of Jobbing Shop Operations' (editorial), *Machinery*, December 7 1960, pp. 1294 – 1295; A. W. Astrop, 'Batch Production with Numerically Controlled Machines, Some Aspects of Short Brothers and Harland, Ltd., Queens Island, Belfast, for the Production of Aircraft Components in Small Quantities', *Machinery*, May 10 1961, pp. 1044 – 1048; '... the increasing availability of numerically controlled machines offers revolutionary possibilities for the production of a very wide range of work-pieces in small and medium quantities'. 'The need for a rational re-equipment policy' (editorial), *Machinery*, December 24 1962; 'Tape-controlled (NC) machines ... have been found to give the short-run jobbing shop advantages that were possible before only where parts were being mass-produced'. 'Advantages of numerical control for small batch production' (editorial), *Machinery*, June 26 1963, p. 1442; 'Now with vertical turret lathes and a drilling machine – all numerically controlled – a single flywheel can be progressed from order to delivery in a maximum of 48 hours'. Alexander Cechanowicz, 'Economic flywheel production on numerically controlled machines', *Machinery*, August 7 1963, p. 292; 'Numerical Control' (Editorial), *Machinery*, 19 October 1960, pp. 874 – 875; also 'The need for more rapid adoption of numerically controlled machines' (editorial), *Machinery*, April 29 1964, p. 967; 'The economics of numerical control' (editorial), *Machinery*, February 26 1964, p. 455; 'Numerically controlled machine tools' (editorial), *Machinery*, July 15 1964, p. 223; 'Conference on numerically controlled machine tools' (editorial), *Machinery*, March 10 1965, p. 547; 'The need for wider application of numerically controlled machine tools' (editorial), *Machinery*, April 28 1965, p. 899.

- 350 For example, it was proposed that CNC was 'economical for mass-production [as well as] batch and in many cases single-item production'. Gibbs, *Introduction*, p. 1; S. C. Black, V. Chiles, A. J. Lissaman and S. J. Martin, *Principles of Engineering Manufacture, Third Edition* (London: Arnold, 1996), pp. 190 - 191 also David F. Noble, *Forces of Production: A Social History of Industrial Automation* (New York: Alfred A. Knopf, 1984), p. 84.
- 351 'A new wave of technological change began to transform process technology from the mid 1970s ... [as CNC] ... enhanced flexibility and reduced the minimum efficient scale [and thus] reduced the optimum level (of production)', Foreman-Peck, Bowden, and McKinlay, *Motor Industry*, pp. 122 – 124; also J. Muellbauer, 'Productivity and competitiveness in British manufacturing', *Oxford Review of Economic Policy*, 3 (3), 1977 quoted in Lloyd-Jones and Lewis, *Capitalism*, p. 201; 'Gaining control', *American Machinist*.
- 352 For example, one manufacturer of CNC systems proposed that its product was suited 'to job shops in the name of shopfloor editing and operator control' while at the same time promoting it 'to managers of large firms in the interest of ... greater management control'. Noble, *Forces of Production*, pp. 326, 328 – 329; also Piore and Sabel, *Second Industrial*, pp. 217 – 218.
- 353 For example, '... from the 1970s, a falling level of employment in manufacturing sparked off a fear of "deindustrialization"'. Millward, 'Industrial and Commercial', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 124; Lloyd-Jones and Lewis, *Capitalism*, pp. 183 - 184, 187; Cairncross, 'Economic Policy and Performance, 1964 - 1990',

indication of mounting economic weakness and accordingly, in November 1975, it signalled its renewed commitment to intense intervention. The proposed solution was to be increased government involvement in practically all aspects of industry and commerce, and to this end, a 'new style' of planning was introduced. Its key strategy was based on the creation of 'modern', internationally competitive 'national champions' which would be selected by government institutions and supported by government funding. Soon, however, instead of nurturing future industrial winners the government became ideologically constrained to bail out current failures and, as inflation gradually became the focus of attention, the objective of intervention turned to ameliorating the effects of high and rising unemployment.³⁵⁴

The severity of the macroenvironmental difficulties faced by virtually the whole of the British manufacturing industry between 1978 and 1986 surpassed those of any other peacetime period of the twentieth century.³⁵⁵ By the end of 1982, employment in this sector of the economy, which had been falling gradually since the mid-1960s, had decreased sharply and by 1983 exports of British manufactured goods had fallen below the level of imports.³⁵⁶

The fundamental causes of these two closely related developments are perhaps the most discussed aspects of a period of British economic history that is otherwise replete with hypotheses relating to phenomena, ideologies, and personalities.³⁵⁷ Where most economic historians agree, however, is that the conditions for their emergence lay in the anti-inflationary economic policies of the post-1979 government.³⁵⁸ Typical of their analyses is

in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 90; Alford, *Britain in the World*, p. 252.

354 Porter, 'Government and the Economy', in Coopey and Woodward, *Britain in the 1970s*, p. 43; Tomlinson, 'British Economic Policy Since 1945', p. 276; Feinstein, 'Success and Failure', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 113; Coopey and Woodward, 'Overview', in Coopey and Woodward, *Britain in the 1970s*, p. 17.

355 'The beginning of the Thatcher epoch was little short of a disaster for the British manufacturing sector ...' Lloyd-Jones and Lewis, *Capitalism*, p. 201; by 1981 '... [the British] manufacturing industry had shed 10 per cent of its labour force in a year and large numbers of firms were being forced out of business ...' Cairncross, *British Economy*, Second Edition, p. 244; in 1982, 12,000 companies went into liquidation, manufacturing output fell by 14.5 per cent and investment in manufacturing fell by 36 per cent. Gamble, *Decline*, pp. 191 – 195; 'Clearly, looking at the period 1979-87 as a whole ... from the output and employment side, the results appear to range from poor to disastrous'. Maynard, *Thatcher*, p. 89.

356 Maynard, *Thatcher*, pp. 89 – 90; Stephen Bazen and Tony Thirlwall, *Deindustrialization (Studies in the UK Economy)* (Oxford: Heinemann, 1991), pp. 55; Cairncross, 'Economic Policy and Performance, 1945 - 1964', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 33; Cairncross, 'Economic Policy and Performance, 1964 - 1990', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 90; Alford, *Britain in the World*, p. 316.

357 'Not even Winston Churchill (whom she [Margaret Thatcher] greatly admired) had given birth to a personal "ism"' Trevor May, *An Economic and Social History of Britain 1760 – 1990*, Second Edition (London: Longman, 1995), pp. 455, 461; Alford, *Britain in the World*, pp. 312, 317, 322.

358 '... the present [1982] government has done more damage more rapidly than any previous administration'. Pollard, *Wasting*, p. 165; moreover, although by March 1983 inflation '... was down to 5 per cent, the achievement was partly the result of huge unemployment', Jeremy, *Business History of Britain*, p. 53; 'The sharp rise in unemployment during 1979-83 was thus to a large extent the cost of the reduction of inflation', Stephen Broadberry, 'Employment and

the unambiguous and seemingly logical assessment offered by Cairncross, that the contraction was an inevitable result of a rapid increase in the value of the British pound brought about by abnormally high interest rates, combined the difficulties in raising credit then being encountered by manufacturing firms.³⁵⁹

There are, however, scholars who have proposed alternative reasons. According to Steven Toms and Mark Wright, for example, many firms in the engineering industry were equipped with outdated machinery and systems 'reflecting decades of under-investment'. Maynard believed that the link between economic policy and the decimation of the manufacturing sector was superficial, and that it was the inevitable result of overmanning in previous years, an opinion that echoes that of the then Prime Minister. However, as discussed more fully below, overmanning can be a somewhat skewed and subjective measure of efficiency, and it is doubtful whether firms like Gardner indulged in it gratuitously. Moreover, as the research for this thesis clearly revealed, in the early 1980s Gardner's plant was by no means obsolete.³⁶⁰

Although, by 1983, the deep recession of the previous four years had eased, it had left the manufacturing engineering industries of Britain in general, and that of the Northwest in particular, decimated. In Bolton, for example, Dobson and Barlow, manufacturers of textile machinery, founded in the late-eighteenth century and one of the world's oldest engineering firms, closed down in 1982, and the machine tool manufacturer Thomas Ryder and Son, founded in 1865, disappeared in the same year: however Hick Hargreaves and Company, founded in the 1830s, endured. Similarly, in Oldham firms like Ferranti and Platt were also on the verge of closure during the 1980s, while Seddon Atkinson, an erstwhile Gardner customer, albeit in a much reduced condition, survived.³⁶¹

Unemployment', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 217; 'British companies suffered a sudden loss in competitiveness of 20 per cent. The consequence was a major contraction of manufacturing industry'. Gamble, *Decline*, pp. 191 – 195.

359 Cairncross, 'Economic policy and performance, 1964 – 1990', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 87; Cairncross, *British Economy*, Second Edition, p. 244; also Feinstein, 'Success and Failure', in Floud and McCloskey, *Economic History of Britain*, Second Edition, Vol. 3, p. 114; also Pollard, *Wasting*, p. 165.

360 '... if "monetarism" was the spark that fired the explosion of unemployment, the gunpowder had certainly been well and truly laid much earlier. There would be little disagreement that much of the UK manufacturing industry in the 1970s was excessively overmanned and afflicted by low labour and capital productivity'. Maynard, *Thatcher*, p. 128; see also Thatcher, *Downing Street Years*, p. 119; Steven Toms and Mike Wright, 'Divergence and Convergence within Anglo-American Corporate Governance Systems: Evidence from the US and UK, 1950-2000', *Business History*, 47 (2), 2005, p. 279.

361 Bazen and Thirlwall, *Deindustrialization*, p. 52; Owen Ashmore, *Industrial Archaeology of Lancashire* (Newton Abbot: David and Charles, 1969), p. 248; Brief History of Dobson and Barlow published by the firm in 1927, Bolton Library Local History Archive ref. ZDB; *Bolton Evening News*, Bolton Library Local History Archive, Local Press Cuttings 1967 to 1998, Ref. 621/ctg; Thomas Ryder and Son, *Machines to Make Machines 1865 to 1965, a centenary booklet* (Derby: Bemrose and Sons, 1968), Bolton Library Local History Archive ref. 621/RVD; P. W. Pilling, *Hick Hargreaves and Co., The History of an Engineering Firm c. 1833 – 1939, a Study with Special Reference to Technological Change and Markets*, Unpublished Doctoral

Clearly, therefore, it was possible for firms to surmount the extremely challenging conditions of the early 1980s. Of the four automotive diesel engine builders that existed in Britain in 1978, Cummins and Perkins continued intact, while the Rolls-Royce plant was absorbed into the latter's facilities. Although it seems likely that Perkins made use of some aspects of what remained of the Patricroft factory after 1986, it is clear that its function as a complete engine production facility was never again considered worthwhile.

IV Microenvironmental Background

Diesel engines of the type and size produced by Gardner comprised several hundred individual components, virtually all of which, before 1978, were manufactured at the Patricroft works.³⁶² At Gardner, the production management's task, both unambiguous and exacting, was to ensure that a steady and balanced flow of components arrived at the assembly department in quantities sufficient to permit complete engines to be built and shipped in accordance with the firm's contractual obligations.³⁶³ The components were produced using a type of flexible manufacturing technique commonly employed by firms whose sales volumes were below that of passenger car companies. Machine tools of various types were arranged in 'flow-lines' or 'cells' according to the required sequence of operations and although components varied in size, they were generally similar in shape and complexity so that each flow-line or cell could be quickly reset to accommodate variations in demand.³⁶⁴ At the assembly stage, a highly skilled and experienced engine fitter took full responsibility for each unit.³⁶⁵

Thesis, University of Liverpool, 1985, p. 27; EIS Group plc, *Annual Report and Accounts*, 1990; The Ferranti Collection, Manchester Museum of Science and Industry Archive Ref. 1996.10; Ultra Electronic Holdings plc, *Annual Report and Accounts*, Greenford, Middlesex, 1999; Oldham Local History Library Archive, Press Cuttings ref. V52 - P15 (OEC).

362 Herbert Frank Purday, *Diesel Engine Design* (London: Constable, 1919 - 1948), *passim*; L. R. C. Lilly, *Diesel Engine Reference Book* (London: Butterworth, 1986), *passim*; on British firms' preference to manufacture 'in-house' see: Lewchuk, 'The Motor Vehicle Industry', p. 138; Joint Shop Stewards' Minutes, 9 July 1976; Joint Shop Stewards' Minutes, 23 July 1976; Joint Shop Stewards' Minutes, 17 September 1976; Joint Shop Stewards' Minutes, 22 October 1976; Joint Shop Stewards' Minutes, 3 December 1976; Joint Shop Stewards' Minutes, 17 December 1976; Nicholas Faith, 'Mr. Hugh and his dream engine', *The Sunday Times*, 9 November 1969, p. 30.

363 'Manufacturing people are responsible for the smooth running of the factory to produce the right products in the right quantities at the right time for the right cost'. Kotler, *Marketing Management*, p. 733; 'The connection between the commercial and the technical function is crucial to any business'. 'General management's production responsibilities' (editorial), *Machinery and Production Engineering*, 27 July 1977; Michael J. Rose, Senior Design Engineer (ret.), BAe systems, Bolton, interviewed by Maurice J. Halton, 23 September 2009.

364 Often referred to as 'group technology', see for example Black, *Factory with a Future*, pp. 32 - 33; also Peter L. Primrose, *Investment in Manufacturing Technology* (London: Chapman and Hall, 1991), p. 94.

365 There are many references to 'flow-lines' and work 'flowing' through the plant. See for example W. Henderson, Patricroft to E. Frow, Manchester, 21 May 1962; D. Waddington, Patricroft, to Mr. E. Frow, Manchester, 18 August 1967; D. Waddington, Patricroft, to Mr. E. Frow, Manchester, 24 February 1970; Minutes of the Shop Stewards Committee meeting dated 17 April 1968. Shop Stewards Minute Books; and in Minutes of the Shop Stewards Committee meeting dated 27 August 1969. Shop Stewards Minute Books; also Scranton, *Endless Novelty*; Edge, *Legendary Engineering*, p. 145; Nicholas Faith, 'Mr. Hugh and his

The introduction of CNC in the late 1960s subsequently gave rise to the concept of the Flexible Manufacturing System (FMS). Described by one expert as 'a combination of the transfer line with an NC machine', an FMS was a group of CNC machine tools controlled by a central computer and linked together by conveyors, robots, or guided vehicles. Compared to transfer lines, which were extremely productive but generally capable of producing only one component, the rationale behind FMS was the economical production, singly and sequentially, of a variety of dissimilar components with minimal interruption and virtually no human intervention.³⁶⁶ However, while an FMS was considerably more flexible than a transfer line, it was much less flexible than a similar number of individual CNC machine tools. Moreover, an FMS was very expensive to acquire and its implementation was far from straightforward.³⁶⁷

Nevertheless, by the late 1970s, FMS technology was attracting a great deal of interest, much of which was generated by unrealistically high levels of expectations. To many firms like Gardner, the perceived opportunity to produce small batches of components for various sizes of diesel engines at costs comparable to, but without the inflexibility of, mass-production methods, in addition to the prospect of absolute management control over a greatly reduced labour force, comprised an almost irresistible attraction.³⁶⁸ However, the high cost of FMS together with its perceived potential to enhance production placed exacting demands on management, and many were installed without adequate preparation and for the wrong reasons.³⁶⁹

dream engine', *Sunday Times*, 9 November 1969, p. 30; also Womack, Jones, and Roos, *The Machine*, p. 24; Jones, *Forcing*, pp. 16 – 17.

366 'An FMS is set apart from any other kind of manufacturing system, such as a transfer line used in high volume automotive applications, because of its ability to accept parts or components in varying quantities, in random order'. William W. Luggen, *Flexible Manufacturing Cells and Systems* (Englewood Cliffs: Prentice Hall, 1991), pp. 7, 9; also Gibbs, *Introduction*, p. 185; Black, *Factory with a Future*, p. 37.

367 'FMS is not a cure-all for productivity and profitability problems. It cannot make order out of chaos ...' Luggen, *Flexible Manufacturing*, p. 27; 'FMS [are] difficult to link to other manufacturing systems. The FMS becomes an island of automation (the inventory piles up all around it like water around an island) ...' Black, *Factory with a Future*, p. 46; also Primrose, *Investment*, p. 163; for a comprehensive appraisal of FMS evolution and its complexities see Roger E. Bohn, (2005) *From Art to Science in Manufacturing: The Evolution of Technological Knowledge*. UC San Diego: Retrieved from: <http://escholarship.org/uc/item/6z6703z5>.

368 'With FMS it is possible to machine two or three different engine blocks ... in low volume at relatively low cost'. Hartley, *FMS*, p. 35; FMS was '... an attempt to achieve higher rates of machine utilization in factories making small batches of components. [as well as] Fordist-style automaticity without the requirement of mass-production scales of standardized products'. Jones, *Forcing the Factory*, pp. 19, 101; FMS had the perceived potential '... to achieve shorter production runs, more frequent setting of machines and higher product quality [as well as] reductions in labour costs and other scale economies'. Bryn Jones, 'Flexible Automation and Factory Politics: The United Kingdom in Comparative Perspective', in Hirst and Zeitlin, *Reversing*, 1989', p. 96.

369 '... FMS will not solve the problems of a mismanaged or poorly organized plant'. Luggen, *Flexible Manufacturing*, p. 27; 'Such a [FMS] system must be scheduled and can be as

V Findings

It was more than six months before Hawker Siddeley appointed a successor to Clayton Flint. There is much evidence to suggest that, during this period, because Gardner operated without the strong leadership that the Chairman of the Board had traditionally provided, a minor organizational crisis took place, when the crucially important coordinated production of engine components became increasingly imbalanced. By the end of February, for example, the foundries were three months ahead and by the end of June, various sections of the machine shops were reporting component shortages. At the same time, an apparent moratorium on recruitment left several vacancies unfilled and, while some labour shortages were resolved by temporarily transferring staff between departments, this appears to have occasionally resulted in confusion over piecework rates and underpayment of bonuses. Unsurprisingly, this often led to dissatisfaction, protests and friction, as well as, on at least one occasion, industrial action.³⁷⁰

Eventually, in late July 1978, Hawker Siddeley announced their decision to appoint A. B. H. Davies, at that time the production director at Mirrlees Blackstone of Stockport, to the position of Managing Director at Gardner. Although Mirrlees was also a Hawker Siddeley subsidiary and a manufacturer of diesel engines, there were several important differences between the two firms, the most significant of which were that the engines it produced were much larger than those made by Gardner, and they were designed for an entirely different market segment. Perhaps more importantly, at least in the context of this chapter, the firm's Stockport factory made extensive use of computers for production planning and work scheduling, as well as for the performance of several other organizational tasks. Moreover, in comparison with what many perceived to be Gardner's 'old and outdated plant', the Mirrlees factory was equipped with numerous modern Computer Numerically Controlled machine tools. For this reason, the appointment of Davies appeared to some to signify Hawker Siddeley's modernizing intentions.³⁷¹

For the rest of 1978 and throughout most of 1979, it is clear that fundamental changes to Gardner's traditional approach to the production of diesel engines were taking place. Whereas, in previous decades, there had been a strong bias towards manufacturing as much of the final product as possible at Patricroft, this philosophy changed radically after Davies' appointment. Production of small batches of complete engines for market segments

complex as the job shop it replaced. ... it is [therefore] necessary to schedule parts and machines within the FMS, just as it is in the job shop'. Black, *Factory with a Future*, p. 37, 46.

370 Shop Stewards' Minutes, 24 February 1978; Joint Shop Stewards' Minutes, 14 June 1978; Joint Shop Stewards' Minutes, 21 July 1978; Joint Shop Stewards' Minutes, 28 July 1978.

371 On the many CNC machine tools installed at Mirrlees see Arthur Barker, 'NC gives GT a lot more bite!', *Machinery and Production Engineering*, 8 April 1981, pp. 25 – 27; Joint Shop Stewards' Minutes, 9 February 1978; J. Parkinson, Patricroft to J. W. Tocher, Salford, 19 June 1978; In September 1978, members of the Gardner Joint Shop Stewards' Committee visited Mirrlees and were very impressed by the number of CNC machine tools in use there, observing that 'This type of machine-tool will most certainly have to be introduced on a larger scale at Gardner in the very near future'. Joint Shop Stewards' Minutes, 22 September 1978.

outside the automotive sector were, in some cases, being subcontracted to outside firms, and components for automotive engines were also increasingly being acquired in this way. Unsurprisingly, given their radical nature, these changes did not always take place without complications. Component deliveries were often behind schedule and quality standards were frequently below requirements, irregularities that led to sporadic shortages at the assembly stage and consequential delays in engine shipments.³⁷²

Nevertheless, by January 1980, the management had outlined plans that promised a more coherent future. New manufacturing technology, computer systems, and enhanced organizational procedures would be introduced during the 'next couple of years'. In the meantime, obsolete machine tools would either be scrapped or transferred to subcontractors, and the space thus created used for the installation of new and more efficient plant.³⁷³ The first major investment would be in an advanced computer controlled manufacturing system for the production of crankcases, one of the three major components of the Gardner diesel engine. The 'AMS', as it came to be called, was ordered in early 1980 from KTM of Brighton, a member of the Vickers Group. Comprising a number of British and German CNC machine tools and ancillary equipment, all linked together by a conveyor system and controlled by a central computer, it was in many ways a typical FMS, but in others, it was similar to a Detroit style transfer line. (see Appendix 5) Its precise cost is unclear varying, depending on the source and the context, between six- and seventeen-million pounds. However, its size and sophistication can be construed from the length of time it was expected to take to deliver, install, and commission, which was, at the time the order was placed, almost two years. Portentously, although Hawker Siddeley would initially fund this considerable investment, it was expected that it would eventually be financed out of Gardner's profits.³⁷⁴

By June 1980, increasingly adverse trading conditions in the British manufacturing engineering industry induced the Gardner management to place the workforce on a four-day week. By the end of July, when it was learned that Foden of Sandbach, an important and long established customer, had been forced into receivership, this was reduced still further to three days. There followed a review of the firm's short- and medium-term prospects which determined that engine sales, already at their lowest level for several years, would continue to fall until at least the last quarter of 1981, with only a modest improvement predicted thereafter. Furthermore, it concluded that although much of the decline in orders could be ascribed to the general downturn, market share was being lost to competitors whose engines

372 Joint Shop Stewards' Minutes, 6 April 1979; Joint Shop Stewards' Minutes, 25 June 1979; Joint Shop Stewards' Minutes, 12 October 1979.

373 Joint Shop Stewards' Minutes, 11 July 1979.

374 Joint Shop Stewards' Minutes, 27 July 1979; Shop Stewards' Minutes, 10 April 1980; Joint Shop Stewards' Minutes, 12 October 1979; Robert Ramwell, Manchester, to Maurice Halton, Horwich, 16 June 2004; Peter Chadwick, Bolton, to Maurice Halton, Horwich, 16 March, 2004; also 'New Crankcase Machining Facility Brief Description', undated document, The Gardner Collection, Working Class Movement Library, Salford.

were both cheaper and more powerful. In order to ameliorate the worst affects of these conditions, it was considered necessary to reduce the 2,400 workforce by 700 by the end of the year.³⁷⁵

Unsurprisingly, the employees and their union representatives actively opposed what appears to have been a precipitous and unilateral action, and for most of October and November 1980, an all-out strike closed the Patricroft factory. It ended when, following the intervention of the Hawker Siddeley group, the management and the employees agreed to a reduction in staffing levels through a system of voluntary redundancy and early retirement.³⁷⁶

Gardner entered 1981 with a full workload but, as the year progressed, receipts of new orders slowed significantly and customers began to postpone delivery of, and even cancel, outstanding orders. As the situation continued to deteriorate, several sections of the plant were placed on short time working in an attempt to reduce costs. Efforts were also made to offset the firm's ostensible over-reliance on the HGV market, probably the worst affected sector, including increased endeavours to secure more business for bus, marine and static engines; all of which had been neglected under the new management. Nevertheless, as business projections for the second half of the year became ever more negative, pessimism among managers and workers appears to have attained near tangible levels, especially by the end of the year when it had become clear that trading losses were being generated.³⁷⁷

In the meantime, the management revealed the findings of their analysis of Gardner's unsatisfactory performance in the market for proprietary automotive diesel engines. Two main problems were identified. The first, and clearly the most serious, was their conclusion that since the Hawker Siddeley takeover, the firm's once unblemished reputation for quality of build and reliability in the field, features upon which Gardner had established itself from the start, had been lost. The second and somewhat less tangible perceived problem was based on an opinion that Gardner's 'antiquated plant ... does not impress potential customers whose businesses reflect the introduction of modern manufacturing technology'. Although it was considered necessary to reduce, wherever possible, the projected level of investment in new plant and machinery, there nevertheless appears to have been subdued

375 Shop Stewards' Minutes, 19 June 1980; Shop Stewards' Minutes, 26 June 1980; Shop Stewards' Minutes, 8 July 1980.

376 Shop Stewards' Minutes, 5 September 1980; Shop Stewards' Minutes, 12 September 1980; Shop Stewards' Minutes, 1 October 1980; Shop Stewards' Minutes, 2 October 1980; Shop Stewards' Minutes, 3 October 1980; Shop Stewards' Minutes, 17 October 1980; Shop Stewards' Minutes, 25 November 1980; Report of the District 11 Organizer, *AEU Journal*, 48 (1), January 1981, p. 24.

377 Shop Stewards' Minutes, 5 March 1981; Shop Stewards' Minutes, 11 March 1981; Shop Stewards' Minutes, 7 April 1981; Shop Stewards' Minutes, 6 June 1981; Shop Stewards' Minutes, 24 March 1981; Shop Stewards' Minutes, 22 April 1981; Shop Stewards' Minutes, 4 June 1981; Gardner management statement dated 20 July 1981.

confidence in the firm's ability to survive its current difficulties.³⁷⁸

For most of 1982, the situation at Gardner deteriorated until the management's increasingly pessimistic outlook, intensified by a series of progressively negative business forecasts, began to assume quasi-apocalyptic proportions. In July, the workforce was informed that a further 100 redundancies were being considered which, by August, had risen to 400. As seriously imbalanced component production schedules continued to cause interruptions and delays in the assembly department, even the relatively modest and much reduced production target of forty engines a week proved increasingly difficult to achieve. Such was the seriousness of this situation that at one stage the management began mooting a proposal to close the works for the three weeks before Christmas in order to re-establish stability. By mid-November, however, a sudden and evidently unforeseen increase in order intake brought the cancellation of this somewhat impetuous plan, as well as the withdrawal of 120 of the redundancies planned for 1983.³⁷⁹

The upsurge in confidence, however, proved ephemeral as a series of developments in the British HCV cluster brought a return to pessimism as well as the implementation of a series of increasingly unconventional and poorly structured stratagems. During 1983, Seddon-Atkinson was acquired by the state-owned Pegaso group of Spain, who greatly reduced the firm's Oldham manufacturing facilities and withdrew from the HGV market. Shortly thereafter, another established Gardner customer disappeared when Leyland closed the Bristol Commercial Vehicles factory in Brislington. At around the same time Perkins re-entered the HGV market with the acquisition of the Rolls-Royce Diesel International plant at Shrewsbury.³⁸⁰

In the meantime, according to the management, Gardner was 'in a very fragile state' and many changes were needed. 'Survival' now entered the vocabulary of their communications, and they began to describe their overall objective as to 'provide employment for around 1,000 people'. They proposed to address their primary concern – the restoration of Gardner's reputation for quality and reliability – by simplifying engines designs in order to make them easier to manufacture, and by purchasing many more components from subcontractors. The latter aspect of this plan included the radical procedure of encouraging

378 'We have earned a reputation for quality and reliability ... this reputation has been tarnished by a number of problems which have occurred in the last year or so'. Minutes of the Joint Consultative Committee, Works Meeting, 8 July 1981.

379 Shop Stewards' Minutes, 1 February 1982; Joint Shop Stewards' Minutes, 27 May 1982; Joint Shop Stewards' Minutes, 10 June 1982; Joint Shop Stewards' Minutes, 14 June 1982; Joint Shop Stewards' Minutes, 29 June 1982; Joint Shop Stewards' Minutes, 7 July 1982; Joint Shop Stewards' Minutes, 11 August 1982; Joint Shop Stewards' Minutes, 3 September 1982; Joint Shop Stewards' Minutes, 27 October 1982; Joint Shop Stewards' Minutes, 28 October 1982; Joint Shop Stewards' Minutes, 18 November 1982; Shop Stewards' Minutes, 8 March 1983.

380 Press Cutting, *Oldham Evening Chronicle*, V56-P50, Oldham Local History Library; Press Cutting, *Oldham Evening Chronicle*, V55-P58, Oldham Local History Library; Leyland, *Official History*, p. 45; Parisson et al, *Perkins*.

departmental managers to set-up small subcontracting businesses equipped with machine tools acquired from Gardner and staffed by ex-Gardner employees. The respective departments were then closed down and the work previously undertaken by them transferred to the new firms. Superficially simple, the actual outcome of this scheme can be perceived in its effect on production, manifested by the complete failure to increase engine output from fifty to sixty units a week.³⁸¹

As 1984 began, the management were obliged to acknowledge that the firm's position had deteriorated further. 'Substantial' losses had been generated during the previous twelve months and although the British market for proprietary automotive diesel engines had 'remained relatively stable', Gardner's share had again fallen in relation to its main competitors. Somewhat naïvely concluding that the firm was not selling enough of its products to cover its costs, the management announced that it hoped '... to preserve the Gardner business as an entity ...' and to this end, they revealed their intention to make another 125 employees redundant. By March, however, in another sudden and unexpected reversal of fortune, a large order for diesel engines was received from a British bus manufacturer who had succeeded in securing a substantial contract from a Hong Kong transport concern. The anticipation that this contract would ensure a reasonable workload for the factory until the middle of 1985 once again restored the management's ostensibly capricious optimism, and they promptly cancelled the previously announced redundancies.³⁸²

It was during 1984 that the AMS began to emerge as an area of concern. As previously discussed, it was initially configured and tooled to machine crankcases, but because of the severely reduced order intake, it was at that time being significantly underutilized. For this reason, an attempt was made to increase its workload by adding cylinder blocks, cylinder heads and various other components to its programme. The main problems in this area were essentially practical. Somewhat unconventionally, Gardner engines were designed with three, rather than two, main components. The crankcase was made from aluminium, an easily worked metal, while the cylinder head and cylinder block were made from cast iron, a material which, while it has different characteristics to aluminium, is by no means difficult to machine. Nevertheless, the addition of these components entailed important changes to the layout and functioning of the AMS: several individual machines had to be reprogrammed, retooled, and relocated; staff were retrained and redeployed, and the electronic systems required modifications needing many hours of attention by a specialized maintenance team. Undoubtedly, such complex alterations were achieved neither easily nor quickly, and they

381 Gardner management notice to employees, 11 February 1983; Minutes of an Informal Conference between Gardner Management and Trade Union officials, 5 May 1983; Shop Stewards' Minutes, 21 July 1983; Shop Stewards' Minutes, 18 October 1983.

382 Shop Stewards' Minutes, 4 January 1984; Gardner Management Statement, 6 January 1984; Shop Stewards' Minutes, 1 February 1984; Shop Stewards' Minutes, 24 February 1984; Shop Stewards' Minutes, 9 March 1984; Gardner management Works Notice dated 12 March 1984.

severely tested the flexibility and effectiveness of the AMS which, by the end of the year, was clearly becoming extremely unstable.³⁸³

By January 1985, the large Hong Kong bus engine contract had been completed, order intake had again plummeted, and short-time working had been introduced in many sections of the factory. Nevertheless, the management pressed ahead with plans to increase the amount of work being subcontracted to outside firms, especially those willing to employ redundant Gardner workers. The increasingly chaotic production schedule was being exacerbated by several ongoing technical problems, particularly on the AMS as the new components were added to its workload. Reports that two new engines introduced in 1984 were giving less than satisfactory performance in the field, almost certainly leading to high warranty costs, coupled with the news that losses had again been generated during the previous year, emphasized the firm's increasingly unsound position. With Gardner clearly on the verge of collapse, the management's announcement that they intended to introduce further redundancies could have surprised few. However, as the fervent exchange of recriminations and reproaches that took place shortly thereafter confirm, it evoked an angry response from the employees' representatives.³⁸⁴

Such discord notwithstanding, the Gardner management persevered with their increasingly ineffectual strategy, explaining in April 1985 that they intended to produce 'a narrower range of [engine] components' at Patricroft, while subcontracting the rest to outside firms. Illogically anticipating that this would 'Improve the quality of all Gardner products' they also implausibly expressed their belief that it would 'Ensure that ... engines ... are produced at substantially lower unit costs than current unit costs'. Perhaps more revealing, however, was the oblique but clear reference to the AMS made in their assertion that this strategy would ensure that more use would be made of '... those facilities in which a heavy investment has been made'. Referring to the disorder that their methods had led to as 'teething problems', they expected that there would still be '... many changes in manufacturing methods, systems and manufacturing control, [and in] systems of quality control'. While those employees that were selectively retained would be urged to make every effort to adapt, others would be

383 '... the AMS is only used for 56% of a single shift per week and is, therefore, directly affecting the profitability of the Company'. Communication from C. N. McKellen, Gardner Production Engineering Manager, August 1984; Most diesel engine producers made the complete engine block in a single, cast iron, structure. See Joint Shop Stewards' Minutes, 10 December 1979; Communication from C. N. McKellen, Gardner Production Engineering Manager, August 1984; Shop Stewards' Minutes, 9 July 1984; Shop Stewards' Minutes, 23 November 1984; Peter Chadwick, Bolton to Maurice Halton, Horwich, 16 March 2004.

384 Shop Stewards' Minutes, 9 January 1985; Shop Stewards' Minutes, 18 January 1985; Minutes of Conference dated 21 February 1985; Shop Stewards' Minutes, 22 February 1985; Shop Stewards' Minutes, 28 February 1985; Shop Stewards' Minutes, 5 March 1985; Gardner management statement dated 5 March 1985; Shop Stewards' Minutes, 8 March 1985; Shop Stewards' Minutes, 14 March 1985; Shop Stewards' Minutes, 15 March 1985; Shop Stewards' Minutes, 21 March 1985; D. Oswald, Patricroft, to R. Robinson, Patricroft, 28 March 1985; R. Robinson, Patricroft, to The Gardner Board of Directors, Patricroft, 28 March 1985; Shop Stewards' Minutes, 9 April 1985; also Edge, *Legendary Engineering*, p. 204.

encouraged to accept jobs with subcontractors.³⁸⁵

During the next few months, notwithstanding a much-reduced level of order intake, Gardner's increasing difficulties in meeting delivery schedules began to oblige long-standing customers to turn to the firm's main competitors. Against a background of almost constant change, personnel were transferred to the AMS section, the volume of components subcontracted to outside firms was increased significantly, more sections were closed down, and several more machines were transferred to subcontractors. If and when the AMS was able to produce the additional components is not known, but it is clear that the subcontracting aspect of the management's strategy was generally disastrous. Many bought-out components, having failed to pass goods inward inspection, were returned to suppliers for rectification or scrapping, while others, having passed inspection, were nevertheless causing engines to fail on test, necessitating disassembly and re-build. Some subcontractors declared themselves bankrupt, leaving Gardner encumbered with stocks of substandard components. Under such conditions it was inevitable that the firm's reputation would worsen and that its commercial viability would thereby be threatened. Thus, by August, it was revealed that, according to the management's estimates, Gardner's share of the UK market for proprietary diesel engines had fallen to less than two per cent.³⁸⁶

Eventually and, under such circumstance, inevitably, the situation at Gardner attracted the attention of the Hawker Siddeley Group board of directors who, in October 1985, informed the Works Committee that they were no longer willing to 'support a loss-making firm like Gardner', and a decision would be made before Christmas regarding its future.³⁸⁷ It is doubtful if anyone concerned failed to appreciate the unmistakable implications of this terse and unadorned communication. Clearly, whatever the details of this decision would be, it would bring Hawker Siddeley's hapless association with Gardner to an end. Unlike the meeting of a few months earlier, the minutes of a discussion between the Gardner management and the employees' representatives held shortly thereafter reveal a general atmosphere of resigned despondency. With Gardner on the threshold of failure, only the senior managers found it appropriate to indulge themselves in vain retrospection. If, complained the Managing Director A. B. H. Davies, '... we [presumably Hawker Siddeley] had ... invested [fourteen million pounds] in a Building Society ...' instead of spending it on

385 Memorandum of Agreement between L. Gardner and Sons and the CSEU, 16 April 1985, ref. SBL/CE; Shop Stewards' Minutes, 16 April 1985; Carl Lingard, Inverbeg, to Maurice Halton, Horwich, 20 September 2003.

386 Shop Stewards' Minutes, 14 March 1985; Shop Stewards' Minutes, 25 April 1985; Gardner management statement dated 7 June 1985; F. Mann, Patricroft to R. Robinson, Patricroft, Internal Memorandum, 'Technology Changes - Components Transfer to AMS', 13 June 1985, ref. FM/CE; Shop Stewards' Minutes, 13 June 1985; Gardner Management communication in response to wages and conditions claim dated 27 June 1985; Shop Stewards' Minutes, 23 July 1985; Shop Stewards' Minutes, 24 July 1985; Joint Shop Stewards' Minutes, 19 August 1985; Shop Stewards' Minutes, 19 September 1985; Minutes of an external conference dated 7 October 1985.

387 Shop Stewards' Minutes, 22 October 1985; Joint Shop Stewards' Minutes, 22 October 1985.

Gardner then 'we' would have made a profit instead of a loss.³⁸⁸

Although no official announcement was made, over the next few weeks it became clear that Hawker Siddeley was attempting to sell Gardner as a going concern and to this end, the firm's fixed costs were being cut back to the bare minimum. Announcements that the workforce would be reduced to 480, or half of its current number, was followed by the closure of several more sections of the already much downgraded manufacturing facilities.³⁸⁹ By mid-January 1986, rumours were circulating that a prospective buyer had been found, and that negotiations had reached a critical stage.³⁹⁰ Shortly thereafter, the Salford local press reported that a group of executives representing Perkins Engines of Peterborough had recently visited the Patricroft works, suggesting that a takeover by that firm was imminent.³⁹¹ While refusing to reveal the name of the potential buyer, the management confirmed that negotiations were indeed taking place and, in order to advance the possibility of a successful outcome, the size of the workforce would be reduced by a further 300 by June.³⁹² Having disposed of these matters with virtually no resistance from the employees, Hawker Siddeley revealed that Gardner would become a subsidiary of Perkins on the last day of April 1986.³⁹³

Little is known of the few years between the Perkins takeover and the final extinction of L. Gardner and Sons. Certainly, no trade union records exist that cover this time, and nor are Perkins in any way disposed to disclose more than elementary information. Nevertheless, it is clear that few, if any, Gardner diesel engines emerged from Patricroft after 1986. It can therefore justifiably be asserted that the departure of Hawker Siddeley signalled the end of the once reputable, profitable and successful family firm founded 120 earlier by a young mechanic from Liverpool.

VI Analysis

The most surprising aspect of Hawker Siddeley's acquisition of Gardner is their observable lack of preparation. Between the departure of Clayton Flint and the arrival of A. B. H. Davies, no one appears to have been placed in overall charge of the Patricroft factory and, as a result, interdepartmental coordination seems to have broken down and production became seriously imbalanced. Moreover, there appears to have been little improvement even after

388 Minutes of a Meeting between the Gardner Management and Trade Union Officials dated 30 October 1985; Joint Shop Stewards' Minutes, 31 October 1985; Shop Stewards' Minutes, 7 November 1985.

389 Minutes of a Meeting between the Gardner Management and Trade Union Officials dated 30 October 1985; Joint Shop Stewards' Minutes, 31 October 1985; Shop Stewards' Minutes, 7 November 1985; Shop Stewards' Minutes, 15 November 1985; J. M. Griffiths (Gardner Production Executive), Patricroft to R. Robinson, Patricroft, 6 December 1985.

390 Shop Stewards' Minutes, 17 December 1985; Shop Stewards' Minutes, 14 January 1986.

391 'Gardners: New Buyers Emerge?', *Eccles and Irlam Journal*, 23 January 1986, p. 1.

392 Shop Stewards' Minutes, 18 February 1986; Shop Stewards' Minutes, 20 February 1986; Management Notice to Gardner Employees, 24 February 1986.

393 Shop Stewards' Minutes, 27 February 1986; Shop Stewards' Minutes, 19 March 1986; Shop Stewards' Minutes, 16 April 1986.

the appointment of Davies, whose main concern was clearly the acquisition of new technologically advanced machinery and computer systems. Thus, as the new management concentrated on medium- and long-term considerations, the day-to-day running of Gardner became increasingly disorganized.

Seemingly oblivious to these conditions, the new management's explicit agenda was largely centred on change, particularly to Gardner's fundamental approach to the production of diesel engines. The first aspect of their strategy, which involved a reversal of the established policy of manufacturing as much as possible internally, began tacitly immediately following the Hawker Siddeley takeover. As the workforce shrank due to natural wastage, the level of work subcontracted to outside firms gradually increased, rising exponentially thereafter in direct proportion with a series of redundancy programmes. The second aspect was overt, in that the new management soon made it known that they intended to replace the firm's 'old and outdated plant' with 'modern manufacturing technology'.³⁹⁴

However, while both of these approaches are fundamentally sound, they require careful preparation and controlled implementation. Firms that subcontract a significant volume of their components necessarily develop different types of quality control and expedition systems than those needed by firms that prefer to retain such work 'in-house'. Furthermore, in order to maintain a balanced supply of components, the application of more productive plant requires careful consideration in order to avoid the creation of 'islands of automation', which, while solving one production bottleneck, simply create others 'down the line'.³⁹⁵ Ultimately, however, because the Gardner management neglected to realize either of these essential measures, they failed to safeguard the firm's most important attributes: its reputation for high-quality, reliable, and fuel-efficient diesel engines.

The effective utilization of FMS depended heavily on sound basic management functions such as production planning and organization in the workplace, qualities that were evidently absent at Gardner after the Hawker Siddeley takeover. In the end, the AMS failed because it could reliably produce neither the engine component it was designed for, nor any of the others that its suppliers undoubtedly claimed it could. Nevertheless, and notwithstanding the fact that it had been acquired by the ineffective management that they themselves had imposed upon the firm, Hawker Siddeley insisted that Gardner repay the loan that had been advanced for its purchase.

The system of outsourcing or subcontracting component production to outside firms had

394 Joint Shop Stewards' Minutes, 9 February 1978; Minutes of the Joint Consultative Committee - Works Meeting dated 8 July 1981; Lewchuk, 'The Motor Vehicle Industry', in Elbaum and Lazonick, *Decline of the British Economy*, p. 138; on some of the perceived drawbacks of outsourcing see Lloyd-Jones and Lewis, *Alfred Herbert*, pp. 78 – 79.

395 'If the initial motivation [to purchase FMS] had not been to improve product delivery, it is probable that the FMS which was selected would not be able to produce all of the key components which were affecting product delivery. Therefore, although the FMS might improve the delivery of individual components, it would not improve product delivery'. Primrose, *Investment*, pp. 52 – 53; also Black, *Factory with a Future*, p. 46.

been in use in Britain for many years as an established means of reducing direct costs or of accessing expertise that would not otherwise be available. Its advantages were well-known to Japanese automotive firms whose innovative 'kanban' or 'Just in Time' systems had, by the 1970s, been refined and disseminated to their subcontractors with whom they formed especially close relationships.³⁹⁶ However, while Gardner had routinely purchased a small number of discrete units from specialist suppliers, they rarely subcontracted individual engine components and during Clayton Flint's period in office very little of this type of outsourcing had taken place. In 1978, therefore, no 'kanban' type co-operative relationships existed with outside firms, at least to the extent that would allow outsourcing to be rapidly increased without the likelihood of negative repercussions.

It is difficult to establish a reasonable explanation, given the alternative opportunities that ostensibly existed within the Hawker Siddeley Group, either for the seemingly arbitrary selection of subcontractors for the production of individual components, or for the outsourcing of some complete engines. At that time Hawker Siddeley controlled both Mirrlees and R. A. Lister, both of which were experienced in diesel technology and may well, therefore, have had well-developed outsourcing systems. Nevertheless, the Gardner management does not appear to have sought their co-operation or advice. Moreover, component outsourcing seems to have developed as a reaction to events, rather than as part of a coherent long-term strategy, and it is clear that by the end of 1979 some negative effects of this policy were beginning to damage the firm's relationship with its customers.

As the effects of the 1980 recession began to impinge on Gardner's trade, the management's claim that the fall in sales was due to the Gardner product being too expensive and underpowered may have been to some extent justified. However, although by the middle of 1981 it had become clear that the firm was losing its reputation as a supplier of superior and reliable engines, at no stage do the management appear to have linked this development with a need to improve quality control and resolve logistical failings. Instead of addressing these elementary problems, they proceeded to redesign the range of engines in order to make them easier to manufacture and to increase further the volume of outsourced components. Both of these actions fundamentally altered those aspects of the Gardner product upon which its success had been built, and thus resulted in further losses of market share and a corresponding deterioration in the firm's financial performance.

As the crisis at Gardner deepened, efforts to reduce fixed costs became increasingly unconventional. By the end of 1984, subcontractors were being selected not for their reliability or their capacity to produce quality components, but for their willingness to employ

396 'Japanese firms during the 1970s and 1980s in civilian sectors such as automobiles ... have enhanced their flexibility and improved the quality of their products by turning out components in small batches "just in time" to meet the demands of rapidly changing production programs. [and] constructed complex mechanisms for orchestrating collaboration with suppliers and subcontractors in product development, process improvement, and logistical co-ordination'. Zeitlin, 'Flexibility and Mass Production at War', p. 76; also Daito, 'Automation and the organization', pp. 139 – 178.

redundant Gardner staff and takeover Gardner machine tools: presumably including some that the new management had considered to be 'out of date'. The tragic irony of this situation is accentuated by the likelihood that it was the failure of the AMS to deliver improvements in production that induced increased outsourcing, and because it was purchased with what in reality was a loan from Hawker Siddeley, its high costs and the burdensome level of repayments exacerbated Gardner's financial problems. Constrained by these circumstances to progressively cut overheads, the management introduced a series of redundancy programmes, which undoubtedly reduced the firm's ability to manufacture in-house and necessitated more outsourcing leading to a further loss of control over quality and delivery, thus generating a spiral of desperation, the eventual outcome of which was inevitable.

CHAPTER 6

CONCLUSIONS

I The First Eighty-Seven Years

The central objective of this thesis was to explore, through the close examination of a single firm, a variety of issues concerning the British manufacturing engineering industry during the mid to late twentieth century. The first task, however, was to resolve assumptions of innate, deep-rooted weaknesses allegedly derived from flawed judgements and misguided attitudes acquired between Gardner's late nineteenth-century beginnings and the mid-1950s. In chapter 2, a concise narrative history of the first eighty-seven years of the firm's existence, derived from evidence gathered mainly from primary sources, and a review of secondary literature, revealed several disparities between Gardner and what is often regarded in the historiography in economic and business history as a quasi-typical British industrial enterprise.

The findings of this investigation show that, in the context of twenty-first century free-market capitalist society, L. Gardner and Sons cannot be considered to have failed at any stage before 1955. There can be no doubt that Lawrence Gardner's purpose was to provide an income and a measure of security for his wife and children, and this he accomplished admirably. Perhaps the second generation of family managers were more technologically focused, although it would be difficult to demonstrate that they placed such matters before the attainment of wealth and status. However, why this should be regarded as a weakness is hard to understand: unless, of course, it is viewed from the Chandlerian perspective that making profits was acceptable as long as they were 'long-term' and did not take precedence over 'increased assets' and 'tenure for [non-family] managers and ... workers' instead.³⁹⁷

Although during his lifetime Lawrence Gardner's nascent enterprise remained essentially a jobbing concern, it provided a living for his large and expanding family as well as for a steadily increasing number of employees, so that by his death in 1890 it had developed into a substantial business. As the eldest son, and therefore the heir apparent, Thomas Harry Gardner would naturally have inherited the business when his father died, but it would be difficult to imagine a person better qualified, either academically or vocationally, to assume control at that time. Under his stewardship, L. Gardner and Sons became a specialist manufacturer of internal combustion engines and, despite encountering severe disruptions brought about by unprecedented macroenvironmental upheavals, its survival and its growth argue against assertions of failure.

During the administration of the second generation, the Gardner family directors seem to have systematically acquired a reputation for innovation and high-quality products, as well as an explicit disdain for American-style mass-production, which they clearly regarded as the

³⁹⁷ See Chandler, *Scale and Scope*, p. 390.

antithesis of excellence. Elusive as such perceptions may be, it is clear that, more than twenty years after the last complete engine left Patricroft, used Gardner diesels are in high demand, and there can be little doubt that they will continue to be so for some considerable time to come.³⁹⁸ Such standing and respectability could not have been won easily in the fiercely competitive and unsentimental environment of the 1930s, when many well-regarded British enterprises foundered. Perhaps the firm's most harmful characteristic was a perceptibly strong aversion to 'outsiders' together with a somewhat unconventional 'line of succession' policy that favoured the oldest surviving brother: a system that, after Thomas Harry's death in 1937, resulted in a series of relatively elderly chief executives whose periods in office were consequently very short. Nevertheless, in 1955 the second generation of Gardner family directors was able to pass on to its successors a firm with a sound reputation and an established clientele, both in Britain and in many other parts of the world.

II The Third Generation of Family Control

The second task was to establish where and if Gardner failed as a family firm after 1955. Guided by a preliminary, but detailed, survey of primary source materials, three discrete case studies were undertaken, each of which investigated a particular crisis during separate, consecutive periods in the firm's post-war history. Chapters 3 and 4 examined markets between 1955 and 1960 and, respectively, workplace industrial relations between 1960 and 1976: chapter 5 examined manufacturing engineering technology between 1977 and 1986. Although, according to some evaluations, Gardner retained some aspects of family control throughout the whole period covered by these three case studies, it is clear that the ownership of the firm changed fundamentally in 1976. For the purpose of this analysis, therefore, 1976 is viewed as the year that Gardner ceased to be a family firm.

In contrast to Thomas Harry Gardner's fortuitous inheritance of control in 1890, the appointment of Hugh in 1955 was probably based on a perceived Hobson's choice. Although Lawrence Gardner's sons appear to have enthusiastically assumed a sense of attachment, duty and responsibility in relation to the family business, the third generation seem to have behaved somewhat differently. It is clear that, at least in his youth and early adulthood, Hugh Gardner enjoyed certain middle-class privileges that were not conducive to diligence and learning. In fact, none of the founder's grandchildren appears to have been as keen on gaining the sound academic foundation that could have been the basis of further development. Indeed, some of them had little or no interest in working in the family business, and those that did appear to have been content simply to wait for the opportunities that would inevitably emerge as their relatives succumbed to old age. In the meantime, at least for one or two Gardners, the life of a 'gentleman', of irresponsibility, thrills and pleasure-seeking as well as that of a 'player', offered an attractive alternative.

Fundamentally, it seems more than likely that the Gardner family shareholders' acceptance

³⁹⁸ See, for example, <http://www.gardner-enthusiast.com/>.

of Hugh as CEO was based mainly on kinship, coupled with a belief that the favourable market conditions of the mid-1950s would continue long enough to safeguard the firm's long-term security. If not, it seems reasonable to assume that the presence of specialized professionals in two of the most important areas of management would provide sufficient support to overcome any major problems that may emerge. However, ensuring the availability of expert advice is no guarantee of its being taken, especially under circumstances in which the protagonist believes that he has, or at least should have, full control of any given situation. Moreover, while the shareholders would almost certainly have expected that Hugh, as a family 'insider', would safeguard their interests, it is clear that he placed far more importance on his personal status.³⁹⁹

Markets

Although no evidence was found to suggest that he personally supervised the everyday running of the plant, it seems likely that once Hugh Gardner had established his authority no decisions relating to operational matters progressed without receiving his explicit sanction. There are, however, indications that Hugh's fascination with technical matters resulted in the firm becoming what Kotler terms a 'product-oriented organization' in which managers concentrate on the quality of the product rather than on the needs of the customers and thus develop 'marketing myopia'.⁴⁰⁰ Perhaps it was this disposition, as well as a not entirely unfounded conviction that Gardner engines were 'the best', that led the management to believe that the it's market position was invulnerable and for that reason it discounted the significance of a threat made observable by forewarnings of impending and inevitable change.

Whether the failure to act when action was called for was a result of Hugh Gardner's autocratic control or the considered outcome of a collective managerial decision, it was an inexcusable error for which the chairman must be held responsible. While the loss of revenue would have been significant in itself, the effects of Gardner's 'myopia' undermined its position as market leader, creating at the same time an unexpected and valuable opportunity for a much larger, and impressively resourced, American competitor. Moreover, although a remedy was quickly found, the speed and efficiency of its implementation highlights the flexibility of the plant and the proficiency of the employees and thus emphasizes the illogicality of management's inertia.

Unfortunately, the events of the late 1950s are not the only evidence to suggest that the

399 For example, '... problems caused by deep-seated personality characteristics cannot generally be combated by superimposing "rational" techniques on the organization. ... a paranoid executive will not become less so just because he is given a better information system.' Kets de Vries and Miller, *Neurotic Organization*, p. 175.

400 'Hugh Gardner ... and his brother, Mr. John, have made it their life work to perfect the engine ...' and '... Mr. Hugh's office [was] littered with valves, pistons and two engineers' drawing boards in a workmanlike chaos ...' Faith, 'Mr. Hugh'; 'Many ... managers are caught up in a love affair with their product and fail to appreciate that the market may be less 'turned on' and may even be moving in a different direction'. Kotler, *Marketing Management*, pp. 17 – 19.

Gardner management was afflicted with 'market myopia'. In 1955, the firm offered a relatively wide range of engines to a reasonably diverse variety of customers in a fairly broad spectrum of markets. At that time, sales to automotive customers accounted for around sixty-one per cent of the firm's business, a proportion that increased steadily thereafter until, by 1975, it had reached ninety per cent. During the same period, total annual non-automotive engine production fell from 1,781 units to 399 units, while the number of independent HCV chassis builders shrank from eight to four, the others having been absorbed by the Leyland Motor Corporation. In addition to these changes, Britain's membership of the European Union in 1973 soon led to imports from the large HCV suppliers of France, Germany, Italy and the Netherlands, on top of the already fierce competition from erstwhile EFTA builders like Scania and Volvo. There were, on the other hand, clear opportunities in non-automotive diesel engine markets where much of Perkins' rapid growth had been achieved, and for which Foden, one of Gardner's principal customers, produced a two-stroke, twelve-cylinder 210 horsepower engine.⁴⁰¹ Moreover, although such short-sightedness began during Gardner's era as a family firm, as part of the Hawker Siddeley group it became even more pronounced so that, by 1986, the automotive industry seems to have been considered as the only market worth competing in.

Workplace Industrial Relations

Government interference, archaic arbitration procedures, overcomplicated payment systems, confrontational shop stewards, and weak management are among the most commonly cited causes of dysfunctional industrial relations in the 1960s and 1970s. In the case of Gardner, however, only the latter stands out, but here the weakness stemmed not from a lack of power, but from a pusillanimous aversion to interact with ordinary employees. Whereas, in the pre-war era and in the immediate post-war years, the most senior Gardner family directors had taken an active role in workplace industrial relations, there are no records of either Hugh or John Gardner continuing this tradition after 1955. Responsibility for such matters were entrusted to William Gordon Thompstone, a non-family works director who, although he was not an engineer, was well educated and experienced in the legal aspects of trade union and employment affairs. Nevertheless, the influence of Hugh Gardner's customary approach is unmistakable. In particular, his habit of taking disputes to the verge of conflict in the hope of forcing the opposition to make concessions is inferred by the number of times the management abandoned negotiations and their frequent refusals to return without preconditions.

While government intervention may have had an indirect influence, no evidence was found to suggest that incomes legislation adversely affected industrial relations at Gardner. Nor was there any reluctance, at least among the shop stewards, either to adhere to agreements reached through the Provisions for the Avoidance of Disputes, or to make use of the

401 'Engines At The National Boat Show', *The Engineer*, 28 January 1955, p.140; 'Engineering, Marine and Welding Exhibition', *The Engineer*, 23 September 1955, p. 433.

somewhat less-formal local system when this was more appropriate. Although the firm's piecework system was ostensibly rather complicated, it appears to have been well understood by managers and workers and it was not therefore a specific cause of disputes. Moreover, although the rules of the Manchester Piecework Agreement were often exploited as a means of persuasion, the management did not propose to abandon PBR as long as Gardner remained a family firm.

Although the influence of the Gardner shop stewards appears to have been fairly significant, most were inclined to use their power to mediate, while the few that agitated for conflict received only limited support, at least until the events leading up to the strikes of 1972 and 1973. By then, the moderate shop stewards had made a series of exceptional efforts to arbitrate, many of which were against the express instructions of the full-time district officials. However, the Gardner management's failure to support the moderates' position effectively nullified their actions and delivered them into the hands of the militants. With their downfall, most moderate trade union activity at Gardner seems to have ended and with it, the management's position collapsed. Thus, when the factory reopened following the prolonged 1973 dispute, the settlement was based on terms more-or-less dictated by the District Committee and a group of new, hard-line, shop stewards. Although thereafter at least some apparently sincere attempts to reconcile differences were made, the relationship between union officials and the management remained detached, a situation that continued until 1975, when most of the Board was replaced and Hugh Gardner had stepped down.

The thirty-month hiatus that followed the appointment of Clayton Flint, especially when contrasted with the sporadic dissonance that characterized Hugh Gardner's period in office, needs little analysis. Without doubt an exceptionally capable manager and a shrewd and resourceful negotiator, like Thompstone, Flint was a law graduate who had chosen to work in industry. Unlike Thompstone, however, he was evidently unwilling and almost certainly far too expensive to act as Hugh Gardner's facilitator. If, in retrospect, Clayton Flint made the establishment of peaceful industrial relations at Gardner seem easy, it is probably because of the effectiveness and pragmatism of his approach compared to the redundant authoritarian policies of his predecessors.

With the benefit of hindsight, of course, it is clear that Flint's brief was to prepare Gardner for sale to the highest bidder. Nevertheless, there is no evidence to suggest that his handling of workplace industrial relations was based on compromise or duplicity and all the improvements he was able to bring about were perfectly genuine. However, in view of the uncertainties prevailing in the mid-1970s, it is not surprising that investors sought to safeguard their financial interests and in this, other than their inherited control of an engineering business, the Gardner shareholders were typical. Thus, in 1976, they decided that their investment in the family firm would be better placed elsewhere: and besides, in all fairness to them, they could not have foreseen that an established and prosperous engineering group like Hawker Siddeley would mishandle matters so disastrously.

Although, as the evidence presented in the first two empirical chapters revealed, Hugh Gardner made two damaging errors, he coped reasonably well with most of the macroenvironmental shifts that occurred between 1955 and 1975, and for most of this period the business made profits. To speculate on possible alternatives would involve a meaningless exercise in counterfactual conjecture and supposition, but it is sorely tempting to imagine the potential long-term outcome of a merger with, say, Foden; although perhaps the legendary aversion to 'outsiders' also applied to family members of other family firms. Nevertheless, there can be no doubt that the sale of Gardner to Hawker Siddeley in 1975, from which the shareholders profited greatly, underscores the firm's viability at that time and precludes any allegations that, under Hugh and as a family firm, Gardner was in any way a failure.

III Hawker Siddeley, the Final Decade

The third case study, narrated in chapter 5, covers the final few years of Gardner's existence, during which fundamental changes were made to those aspects of the firm that had, in the preceding century, been steadily and painstakingly developed. While the delay in the appointment of the new chief executive may be regarded as evidence of Hawker Siddeley's inattentiveness, it would be difficult to exaggerate the incompetence with which the new managers approached the organization of the Patricroft plant once they eventually took control. Clearly ensnared by the fallacious perception that 'new is better', their only discernibly prepared strategy was a determination to acquire sophisticated high-technology equipment without, however, having any clear conception as to how this would further the firm's production, let alone its market, goals. The introduction of increased outsourcing, the other element of their approach, was clearly unplanned and therefore unsystematically implemented. Moreover, although the increasingly disruptive consequences of both of these stratagems soon began to adversely influence the firm's performance in a number of areas, the management seems to have remained irrationally committed to them.

Manufacturing Engineering Technology

As previously discussed, Gardner's policy of manufacturing as much of its product as possible at the Patricroft plant meant that no 'kanban' style co-operative relationships existed with outside firms. Even as a temporary measure, outsourcing created a range of contingent problems which soon resulted in a chain of events that seriously impaired Gardner's relationship with its customers: to pursue it as part of a broad production strategy would have involved the formation of a group of suppliers whose 'mentality' and working practices complemented Gardner's needs.⁴⁰² Clearly, however, the selection of subcontractors became increasingly based on other, less cogent, criteria, some of which entailed the taking-on of Gardner staff and the taking-over of Gardner machine tools. It was thus an *ad hoc*,

402 See Nils Kinch, 'The Road from Dreams of Mass Production to Flexible Specialization: American Influences on the Development of the Swedish Automobile Industry, 1920-39', in Shiomi and Wada, *Fordism Transformed*, p. 121.

partial and fragmented plan, as well as a *de facto* abdication of management's ultimate responsibility for the quality of the product and for customer services.

Although the AMS was not a true FMS, in that it was designed, or at least configured, to produce only one of the three main engine components, it embodied many of its fundamental characteristics. In 1980, this technology was relatively new and although there had been much optimistic speculation regarding its potential, most of this had been generated by machine tool producers and their publicists, and there had been very little hands-on experience of its practical efficacy.⁴⁰³ Even if the AMS had been capable of efficiently producing crankcases, which it apparently was not, this would not have improved the output of complete engines, and the notion that tangible benefits could be derived from impressing potential customers through modernistic display was clearly fallacious. Thus, the Gardner management's lack of judgement led it into purchasing expensive and untried technology, which was incapable of enhancing production, partly on the basis that it would, of itself, advance the firm's standing with its customers.

Compounding these two fundamentally flawed aspects of business strategy, instead of widening the firm's scope, a policy that must surely have suggested itself to them, Hawker Siddeley illogically chose to focus even more narrowly on a market sector that had already changed significantly and was promising to become extremely competitive. It is also apparent that just as the firm became product orientated under Hugh Gardner, during the Hawker Siddeley era it developed a production oriented concept without, however, achieving any of the goals that such organizations, albeit misguidedly, attain.⁴⁰⁴ In the end, the downfall of Gardner occurred not as a middling-sized, flexible, family managed, family-owned firm, but as a part of a large multination corporation, ostensibly administered by university trained 'professionals'.

IV Implications for Further Research

In the mid-1960s, L. Gardner and Sons was one of Britain's eleven-hundred middling-sized manufacturing establishments. At over three billion pounds, the combined annual turnover of these firms comprised slightly less than a third of the value of total manufacturing output, and together they employed more than twenty-six per cent of the population working in manufacturing. Although an 'establishment' is not necessarily the same thing as a firm, it is probable that many, if not most, of these were, like Gardner, single-site companies. Clearly, therefore, and imprecise definitions of 'industrial' and 'manufacturing' enterprises notwithstanding, this section of British business was, at that time, extremely important to the economy. In the somewhat unfamiliar macroenvironmental conditions of the early twenty-first

403 'In the UK there are two complete FMS about which sufficient is known to justify their inclusion in a European survey'. Brian Kellock, 'FMS: flexibility is the byword', *Machinery and Production Engineering*, 13 May 1981, pp. 52 – 53.

404 'The production concept holds that consumers will favour those products that are widely available and low in cost. ... this type of management is open to the charge of impersonality and consumer insensitivity'. Kotler, *Marketing Management*, p. 17.

century, as firms like General Motors and Mitsubishi languish and fail, it is clear that middling-sized firms may well assume a more important position in advanced economies in the not-too-distant future. Clearly, therefore, in order to understand the choices facing industry at this time, it is necessary to clarify the choices made in the past, and for this reason, but not only for this reason, further research is necessary and the histories of such firms should be written.⁴⁰⁵

It is possible that some historians have tended to overlook firms like L. Gardner and Sons either because they did not become as large as some American corporations, or because they are perceived to have acquired characteristics in their creation that made their eventual failure inevitable. On the one hand, it seems highly unlikely that middling-sized firms neither existed nor succeeded in America, while on the other hand the fact that Gardner thrived for well over a century casts doubt on the inherent vulnerability hypothesis. Clearly, as Chapter 2 of this thesis has strongly suggested, postulations of innate deficiencies stem from assumptions of decline, which are themselves largely derived from assertions relating to the somewhat nebulous hypothesis of the (first) Great Depression of the late nineteenth century.

Similarly, the commonly expressed perception that the late-nineteenth-century British engineering industry was hampered by a shortage of trained and qualified people derives from the concept of causality. Again, the evidence revealed in this thesis indicates that Thomas Harry Gardner was not exceptional, and that, at least in the Manchester area, there were outstanding opportunities for the education and training of young engineers. The proposition that because institutions like Owens College were not 'proper' universities and could not, therefore, produce proficient engineers is not sustained in this thesis. Moreover, as previously mentioned, sufficient contextual and contemporary data exists that seems to suggest that Owens was a 'seedbed' of proficient engineers who, like Thomas Harry Gardner, became successful in their subject and worked both in industry and in education; a prospect that, if properly investigated, may shed light on the failing engineering industry allegory.

Advocates of the decline theory have sought, and in doing so found, a variety of explanations for its advent, some of which are so unreasonable as to be almost humorous. Nevertheless, the familiar catalogue of shortcomings that have become fixated in aspects of the historiography in economic and business history are regularly and repeatedly presented and extended to encompass periods much later than the two or three decades that most economic historians view as the years of decline. Thus, a range of imprecise and implied perceptions that surround the 'family firm' shape the histories of British industrial enterprise,

405 Report of the Census of Production, 1963, Table 8 in Morgan, *Economics*, p. 212; Zoltan J. Acs, Bo Carlsson and Charlie Karlsson, eds., *Entrepreneurship, Small and Medium-Sized Enterprises and the Economy* (Cambridge: Cambridge University Press, 1999); Bob Rijkers, Caterina Ruggeri Laderchi and Francis Teal 'Who Benefits from Promoting Small and Medium Scale Enterprises? Some Empirical Evidence from Ethiopia' Policy Research Working Paper, The World Bank, Africa Region, Poverty Reduction and Economic Management Department, May 2008; also Piore and Sabel, *Second Industrial*, *passim*.

assumptions that can only be addressed through comprehensive investigations of the history of individual firms. It is indeed unfortunate that some scholars elected to characterize such 'business biographies' as 'a tradition which, at its best, is a triumph of narrative skill, honest to the facts of the individual case, but at its worst is narrow, insular and antiquarian'. Presumably, it is possible to accept the former qualities, while narrowness, insularity, and antiquarianism are fairly good descriptions of the type of imprecise and value-loaded terminology regularly found in the many comparative studies that are clearly based on 'insights derived from [a] selective and partial view of the historical process'.⁴⁰⁶

Ends

406 Hannah, *Management Strategy*, p. vii; Du Boff and Herman, 'Chandler's New Business', in Supple, *The Rise*, p. 322 – 323.

APPENDICES

Appendix 1, Gardner Machine Tool Acquisitions, 1905 – 1918

Purchased	No.	Make and Description	Origin
19/09/1905	1	Churchill No. 9 Prentice Drilling Machine	British
01/02/1906	1	Reed 6 inch x 5 inch Centre Lathe	British
10/02/1906	1	Betts 7 feet Vertical Boring Mill extended to 91.5 inches swing	American
30/08/1906	1	Bullard 30 inch Boring Mill	American
13/09/1906	1	Biermatzki Gear Cutter	German
12/11/1906	1	Lucas No. 1 Horizontal Boring Machine	British
12/11/1906	1	Morse 30 inch x 4 inch Grinder	N.K.
15/03/1907	1	Redman 30 inch Treble Gearing and Boring Lathe	British
25/03/1907	1	Cincinnati No. 4 Plain Milling Machine	American
25/03/1907	1	Cochrane - Bly 4 inch Sawing Machine	N.K.
25/03/1907	1	Warner and Swasey No. 2 Turret Screw Machine	American
25/03/1907	1	Warner and Swasey Hollow Spindle Hexagon Turret Lathe	American
26/03/1907	4	Cincinnati Plain Milling Machine	American
26/03/1907	1	Potter and Johnston 7 inch x 14 inch Chucking Lathe	British
04/04/1907	1	Asquith 3 feet x 6 feet Radial Drilling Machine with additional flat base plate.	British
04/04/1907	1	Becker No. 5B Vertical Milling Machine with Rotary Table	American
04/04/1907	2	Herbert Drilling Machines with Tapping Attachments	British
05/04/1907	2	Ludwig Loewe 3/32A Turret Lathes	German
05/04/1907	3	Ludwig Loewe 3/32A Turret Lathes	German
05/04/1907	1	6.5 inch Centre Feather Lathe	N.K.
05/04/1907	1	Parkinson No. 7 Sensitive Drilling Machine with Hand and Treadle Feed	British
09/04/1907	1	Herbert 9 inch centres x 9 feet 6 inch bed sliding and screw cutting lathe	British
10/04/1907	1	Barnes 3 Spindle Drilling Machine	American
09/07/1907	1	Herbert 10.5 inch centres x 11 feet 6 inch bed sliding and screw cutting lathe	British
11/07/1907	1	Pittsburgh Machine Co. Second Hand 7 inch a 6 feet American Sliding, Surfacing and Screw-cutting Lathe 'Gem'.	American
16/05/1908	1	Asquith 3 feet x 6 feet Radial Drilling Machine	British
30/07/1908	1	Herbert No. 1 Patent Hexagon Turret Lathe for work up to 1.5 inch x 21 inch	British
02/10/1908	4	Churchill Horizontal Drilling Machines	British
04/11/1908	1	Ward 7 inch Centre Lathe	British
20/04/1909	1	Binns Horizontal Boring Machine	British
07/06/1909	1	Robinson Planing and Thicknessing Machine	British
17/11/1909	1	Herbert 6 inch Centres Gap Bed Lathe	British
21/03/1910	1	Meyer and Schmidt No. 2B Universal Milling Machine	American
27/07/1910	1	Herbert No. 1 Patent Hexagon Turret Lathe	British
30/07/1910	1	Bullard Vertical Boring and Turning Mill with Vertical Milling Attachment	American
07/09/1910	1	Churchill 6 inch x 34 inch Plain Grinding Machine	British
07/12/1910	1	Barnes 3 Spindle Drilling Machine	American
19/12/1910	1	Baush 5 feet Radial Drilling Machine	German
19/12/1910	1	Baush 37 inch Boring Mill	German

19/12/1910	1	Bullard 30 inch Boring Mill	American
19/12/1910	1	Hendey 15 inch Shaper	American
19/12/1910	1	Hendey 7 inch Lathe	American
19/12/1910	2	8 inch Reed Lathes	N.K.
19/12/1910	1	Telig Sonnenthal 16 inch Shaper	German
07/02/1911	1	2 feet Planing Machine	N.K.
08/02/1911	3	Barnes Sliding Head Drilling Machines	American
15/02/1911	4	Redman 10.5 inch Sliding and Surfacing Lathes	British
16/02/1911	1	Redman 14.5 inch Sliding and Surfacing Lathe	British
20/02/1911	1	Churchill 10 inch x 60 inch Plain Grinding Machine	British
20/02/1911	4	Churchill Horizontal Drilling and Tapping Machines	British
20/02/1911	1	Cleveland New Model Automatic Screw Machine	American
22/02/1911	1	Bardon and Oliver No. 2 Screw Machine (Lathe)	American
22/02/1911	1	Churchill 20 inch Drilling Machine	British
22/02/1911	1	Cincinnati Milling Machine with Rotary Table and Vertical Milling Head	American
22/02/1911	1	Kempsmith Un-geared Milling Machine	American
22/02/1911	1	MASS 20 inch Disc Grinder	N.K.
22/02/1911	1	Segourney Drilling Machine	American
03/03/1911	1	Brown and Sharpe No. 2 Surface Grinder	American
03/03/1911	1	Cincinnati No. 2 High Power Milling Machine	American
03/03/1911	1	Newlon Second Hand Milling Machine	British
03/03/1911	1	Potter and Johnston No. 6A Automatic Chucking Lathe with 15 inch Scroll Chuck	American
15/03/1911	1	4 inch stroke Slotting Machine	N.K.
18/03/1911	1	Redman Planing Machine 5 feet 6 inches wide x 4 feet high	British
22/03/1911	1	Butler 12 inch stroke Slotting Machine	British
26/04/1911	1	Brainard Second Hand No. 7 Milling Machine	American
24/05/1911	2	Becker Brainard No. 3 Milling Machines	American
24/05/1911	1	Churchill 4 inch x 24 inch Plain Grinding Machine	British
24/05/1911	3	Churchill No. 1 Drilling Machines	British
24/05/1911	1	Cincinnati No. 2 Milling Machine	American
24/05/1911	1	Potter and Johnston No. 6A Chucking Lathe	American
24/05/1911	1	Potter and Johnston No. 5A Chucking Lathe	American
24/05/1911	3	Redman 8.5 inch x 8 feet bed Sliding and Surfacing Lathes	British
24/05/1911	6	Redman 6.5 inch x 6 feet bed Sliding and Surfacing Lathes	British
25/05/1911	1	Bullard Second Hand Boring Mill	American
25/05/1911	1	Cleveland Second Hand 1.25 inch Automatic Screw Machine	American
25/05/1911	2	Lang 24 inch Surfacing and Boring Lathes	British
25/05/1911	4	Rego 20 in Drilling Machines	N.K.
25/05/1911	1	Schuchardt and Schutte No. 0 Automatic Spur and Spiral Gear Hobbing Machine	German
31/05/1911	4	Type S.L. Hand Lathes 6 inch centres x 4 feet bed	N.K.
31/05/1911	1	Redman Second Process Lathe	British
20/06/1911	1	3 feet 6 inch Radial Drilling Machine	N.K.
20/06/1911	1	5 inch x 5 feet Centre Lathe	N.K.

04/07/1911	1	Ward Two Spindle Sensitive Drilling Machine	British
13/07/1911	4	Redman 10.5 inch raised to 12.5 inch centres x 14 feet bed sliding and surfacing centre lathes.	British
18/07/1911	1	Bullard Second Hand 34 inch Boring Mill	American
03/08/1911	1	Colburn No. 1 Key Seating Machine	American
16/08/1911	2	Bullard Second Hand 34 inch Boring Mills	American
16/08/1911	1	Churchill 12 inch x 2.5 inch Ring Grinding Machine with Magnetic chuck.	British
16/08/1911	1	Herbert Second Hand Centre Grinding Machine	American
23/08/1911	1	Asquith 3 feet 6 inch Radial Drilling Machine	British
26/08/1911	1	Becker Lincoln No. 7 Milling Machine	American
16/10/1911	1	Herbert Four Spindle Patent Ball Bearing Machine	British
25/10/1911	1	Clark Second Hand 6 inch x 5 feet Sliding and Surfacing Lathe	N.K.
25/10/1911	4	Clark Second Hand 6 inch x 5 feet Sliding and Surfacing Lathes	N.K.
25/10/1911	4	Warner and Swasey No. 2 Turret Lathe	American
18/11/1911	1	Becker Second Hand No. 3 Vertical Milling Machine	German
18/11/1911	1	Herbert Second Hand No. 3 Automatic Screw Machine	British
29/01/1912	1	Potter and Johnston No. 5A Manufacturing Automatic Chucking Machine	American
05/02/1912	1	Oliver Surface Planer and Column	British
08/02/1912	1	Internal Grinding Machine	German
23/02/1912	1	Oliver Oilstone Grinding Machine	British
01/08/1912	2	Herbert No. 1 Hexagon Turret Lathes	British
01/08/1912	1	Warner and Swasey No. 1 Turret Screw Machine 5/8 inch Diameter x 4 feet Long	American
10/09/1912	1	Churchill Plain Grinding Machine 6 inch x 34 inch	British
10/09/1912	1	Redman 7 inch Straight Bed Cutting Off and Shaving Lathe 4 feet 4 inches long for Bars up to 1.75 inch Diameter	British
16/09/1912	1	Schuchardt and Schutte No. 1 Patent Gear Hobbing Machine	German
21/09/1912	1	Herbert Ball Bearing Sensitive Single Spindle Drilling Machine	British
30/09/1912	1	Butler 24 inch Stroke Crank Shaping Machine	British
30/09/1912	1	Butler 10 inch x 10 feet General Purpose Lathe	British
28/12/1912	1	Lucas Universal Boring Machine	American
26/06/1913	1	Berment – Niles Motor Driven Boring, Turning and Screw Cutting Lathe 25 inch centres x 36 feet bed	American
31/12/1913	1	Robinson 18 inch Combined Surface Planing and Thicknessing Machine	British
27/04/1914	1	Sensitive Drilling Machine Type C14	N.K.
25/01/1915	1	Allen 8.5 inch x 8 feet 9 inch Sliding and Surfacing Lathe	British
25/01/1915	1	Allen 5.5 inch x 8 feet Sliding and Surfacing Lathe	British
25/01/1915	1	Heald Second Hand No. 75 Internal Grinding Machine	American
25/01/1915	1	LaPointe No. 3 Broaching Machine	American
24/03/1915	1	Herbert 2.25 inch x 24 inch x 12 inch Swing Flat Turret Lather	British
04/05/1915	1	Churchill Standard 4 inch x 24 inch Plain Grinding Machine with No. 0 Drive	British
03/06/1915	1	Norton 14 inch x 72 inch Plain Grinding Machine	American
09/07/1915	1	14 inch x 6 feet Quick Standard Type Lathes	N.K.
09/07/1915	2	14 inch x 6 feet Champion Standard Type Lathes	N.K.
10/09/1915	1	Polishing Lathe No. 584C 10 inch height of centres, spindle 1.5 inch, 36 inches long	N.K.

22/09/1915	1	No. 1.5 National Milling Machine with Back-Gear	N.K.
28/09/1915	1	ACME 8 inch Hack Sawing Machine	American
28/09/1915	1	Armstrong Blum No. 1 Hack sawing Machine	American
01/10/1915	1	Brown and Sharpe 16 inch Gear Cutting Attachment	American
17/11/1915	1	Ward 20 inch Stroke 'Steptoe' Back-Geared Shaping Machine	British
14/03/1916	1	Churchill No. 12 Internal Grinding Machine	British
14/03/1916	1	Churchill No. 2 Internal Grinding Machine	British
22/03/1916	1	Churchill Plain Grinding Machine, 24 inch diameter swing, 32 inch diameter wheel, 12 feet Between Centres	British
01/05/1916	1	Herbert No. 1 Patent Vertical Milling Machine Capacity 30 inch x 12.5 inch x 20 inch height	British
18/12/1916	1	Churchill Plain Grinding Machine 22 inch x 120 inch with K. M. Crankshaft Equipment	British
19/12/1916	4	Butler 12/14 inch Stroke Double Headed Shaping Machines	British
19/12/1916	4	Redman 10.5 inch Raised to 12.5 inch Centres Sliding and Surfacing Lathes	British
21/12/1916	1	Norton 16 inch x 72 inch Plain Grinding Machine with Crankshaft Attachment	American
21/12/1916	1	Norton 14 inch x 72 inch Plain Grinding Machine with Crankshaft Attachment	American
19/02/1917	1	Heald Surface Grinder	American
26/05/1917	1	Brown and Sharpe Crankshaft Grinder	American
10/01/1918	3	Ward Chucking Lathe	British
11/01/1918	1	Grinder	N.K.
10/04/1918	1	Herbert No. 3 Combination Turret Lathe	British
10/04/1918	1	Herbert No. 3 Combination Turret Lathe	British
10/04/1918	1	Herbert No. 9 Combination Turret Lathe	British
16/04/1918	1	Churchill 12 inch x 72 inch Model C Plain Grinder	British
16/04/1918	1	Churchill 4 inch x 24 inch Model A Plain Grinder	British
27/06/1918	1	No. 600 Die Filing Machine	N.K.
09/09/1918	1	Churchill 12 inch Piston Ring and Surface Grinder with Magnetic Chuck	British
24/09/1918	1	Churchill 12 inch x 36 inch Universal Grinder	British
24/09/1918	2	Churchill 12 in x 72 inch Model C Plain Grinder	British
24/09/1918	3	Herbert 12 inch/14 inch Stroke x 8 feet Box Bed Double Geared, Self Acting, Double Headed Shaping Machines.	British
24/09/1918	6	Redman 10.5 inch Centres Raised to 12.5 inch centres box-end, Straight Bed 14 feet length centre lathes	British

Source: Firms' Order Books, The Museum of Science and Industry in Manchester, L. Gardner and Sons Collection. Archive Ref. MS0185 (paper), Location SM22/32.

Appendix 2, Tables

Table 1 – Domestic Freight Transport in Great Britain by Mode (billion tonne kilometres)

	1955	1956	1957	1958	1959	1960	1961	1962
Road	38	38	37	41	46	49	53	55
Rail	35	35	34	30	29	30	29	26
Water	20	22	21	21	21	20	22	24
Total	93	95	92	92	96	99	104	105
% Road	40.86	40.00	40.22	44.57	47.92	49.49	50.96	52.38

Source: Department of Trade and Industry

Table 2 – Road Lengths in Great Britain (miles)

	1955	1956	1957	1958	1959	1960	1961	1962
Trunk	13,309	13,309	13,311	13,372	13,401	13,580	13,628	13,654
Motorway	0	0	0	0	13	153	219	243

Source: Department of Trade and Industry

Table 3 – United Kingdom Production of HCVs, 1955 to 1962

	1955	1956	1957	1958	1959	1960	1961	1962
HGVs	24,272	25,353	24,018	30,257	48,907	73,138	75,334	65,394
Buses	9,657	10,500	12,905	15,071	8,596	10,064	9,908	10,878
Total	33,929	35,853	36,923	45,328	57,503	74,953	85,242	76,272

Source: Society of Motor Manufacturers and Traders, *The Motor Industry of Great Britain, World Automotive Statistics*, (London: Society of Motor Manufacturers and Traders, various annual editions)

Table 4 – United Kingdom Registrations of HGVs, 1956 – 1962

1956	1957	1958	1959	1960	1961	1962
2,102	2,753	2,924	3,418	5,265	6,317	6,238

Source: Society of Motor Manufacturers and Traders, *The Motor Industry of Great Britain, World Automotive Statistics*, (London: Society of Motor Manufacturers and Traders, various annual editions)

Table 5 – Gardner Automotive Engine Sales as Per cent of Total Build, 1956 - 1965

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Total Build	5,033	4,289	3,225	3,793	4,600	4,631	4,508	7,712	4,724	4,505
Auto. Sales	3,414	2,818	2,112	2,713	2,948	3,326	3,610	3,752	3,794	3,562
Per cent Auto.	67.83	65.52	65.49	71.53	64.09	71.82	80.08	79.63	80.31	81.07

Source: Vintage Engine Register quoted in Edge, *Legendary Excellence*, p. 206

Appendix 2, Tables (continued)

Table 6 – Gardner Automotive Engine Sales as Per cent of Total Build, 1966 - 1975

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Total Build	4,433	5,021	5,329	5,560	5,707	6,189	5,680	2,937	3,479	3,868
Auto. Sales	3,628	4,168	4,595	4,987	5,155	5,594	5,381	2,555	2,948	3,469
Per cent Auto.	81.84	83.01	86.23	89.69	90.33	90.39	94.74	86.99	84.74	89.68

Source: Vintage Engine Register quoted in Edge, Legendary Excellence, p. 206

Table 7 – Gardner Automotive Engine Sales by Customer, 1955 - 1962

	1955	1956	1957	1958	1959	1960	1961	1962
Atkinson	419	540	349	327	403	504	590	612
Bristol	417	528	539	515	626	485	533	645
Daimler	167	351	202	152	156	100	271	378
ERF	412	476	436	273	452	509	613	641
Foden	575	712	585	464	603	713	794	762
Guy	696	594	524	275	335	399	238	288
Scammell	85	130	89	49	74	164	191	207
Seddon	0	83	86	57	64	73	96	77
Total	2,771	3,414	2,810	2,112	2,713	2,948	3,326	3,610

Source: Vintage Engine Register quoted in Edge, Legendary Excellence, p. 206

Table 8 – Gardner Automotive Engine Sales as a Per cent of UK HCV Production, 1955 – 1962

	1955	1956	1957	1958	1959	1960	1961	1962
UK Production	33,929	35,853	36,923	45,328	57,503	74,953	85,242	76,272
Gardner Sales	2,771	3,414	2,818	2,112	2,713	2,948	3,326	3,610
% Gardner	8.17	9.52	7.63	4.66	4.72	3.54	3.90	4.73

Source: Vintage Engine Register quoted in Edge, Legendary Excellence, p. 206; Society of Motor Manufacturers and Traders, The Motor Industry of Great Britain, World Automotive Statistics, (London: Society of Motor Manufacturers and Traders, various annual editions.

Table 9 – Gardner Automotive Engine Sales as a Per cent of UK HCV Production, 1963 – 1970

	1963	1964	1965	1966	1967	1968	1969	1970
UK Production	124,589	87,559	138,685	136,664	117,725	124,023	149,252	161,945
Gardner Sales	3,752	3,794	3,652	3,628	4,168	4,592	4,987	5,155
% Gardner	3.01	4.33	2.63	2.65	3.54	3.70	3.34	3.18

Source: Vintage Engine Register quoted in Edge, Legendary Excellence, p. 206; Society of Motor Manufacturers and Traders, The Motor Industry of Great Britain, World Automotive Statistics, (London: Society of Motor Manufacturers and Traders, various annual editions

Appendix 2, Tables (continued)**Table 10 – Survey of selected Manchester-based manufacturing engineering firms listed in Slater's, 1870 – 1910**

	1870	1880	1890	1900	1910
Electrical Equipment Makers	0	1	20	83	172
Engineers, Machinists etc.	68	136	131	196	187
Food Processing Machinery Makers	5	7	16	13	17
Hydraulic Equipment Makers	10	14	8	11	8
Internal Combustion Engine and Motor Vehicle Makers	0	1	2	9	52
Machine Tool Makers	53	45	45	33	38
Railway Equipment Makers	12	9	7	10	27
Steam Engines Makers	33	35	37	35	46
Textile Machinery Makers	59	54	60	48	46
Total	240	302	326	438	593

Source: Slater's Royal National Commercial Directory of Manchester and Salford With Their Vicinities, (Manchester: Isaac Slater, 1870 - 1910) – published annually

Appendix 3, The Manchester Piecework Agreement

Transcript of the Memorandum of Agreement Relative to Piecework Regulations in Manchester and District arrived at between the Manchester Engineering Employers and the Engineering Trade Unions at the Local Conference held on 8 January 1918, submitted to a Ballot Vote of Members, and accepted by them.

1. Each workman's day rate shall be guaranteed, apart from and irrespective of his piecework earnings.
2. Overtime, nightshift, and holiday allowances to piecework prices; only the actual hours worked on the job to be charged against the piece price of the job on which the workman has worked.
3. The piece prices to be paid shall be fixed by mutual arrangement between the duly appointed representative of the employer and the workman or workmen concerned.
4. In order to arrive at mutual satisfactory piecework prices the employer shall have the right to demonstrate the actual time required to perform any operation or job or supervise and time any workman for this purpose. When a job has to be timed, for the purpose of fixing a price, the time shall be reckoned from first taking the job in hand, to putting it on the floor in a finished condition, the employer undertaking that in demonstrating or timing a job or operation, no workman shall be tyrannized or intimidated in any way. It shall be optional whether setting up time for any operation shall be calculated in the piece prices arranged, or separately, or paid for at day time rates.
5. In the event of the employers' representative and the workman failing to agree to the piece price to be paid, the question shall then be submitted for settlement to the management by a committee consisting of representatives of the department concerned. In the event of this procedure failing to arrive at a satisfactory price, the work in question shall then be declared as done as day work.
6. It is agreed that there shall be no limit on piecework earnings.
7. Piece prices once fixed shall not be altered except by mutual arrangement as defined in clause 5, or unless there be a change in the method of manufacture, or alterations in the piece prices as governed by the general rise and fall in wages.
8. It is agreed that cross-bookings when working piecework is inimical to the fixing of satisfactory piecework prices, and both workmen and employers will use every effort to prevent this practice occurring.
9. All piecework results shall be balanced weekly except in cases where jobs extend for more than one week, when they will be balanced the week following completion.
10. Waiting time, standing time, through temporary breakdowns and other causes over which the employers or workmen have no control, shall be paid for at the day rate and any time so paid for shall not be charged against the price of the piecework done.
11. All piecework balances to be paid through the office of the firm in proportion to the workman's rate of wages and the hours he has worked on the job.
12. All piecework prices, together with the particular job or operation, shall be recorded in a place to which the actual workman concerned shall have easy access for examination.

Source: 'Vanguard', May 1947. GB1008, Working Class Movement Library, L Gardner and Sons Collection

Appendix 4, Gardner Notice to Employees, 12 May 1971

Transcript of a communiqué issued by the Works Manager's Office, L. Gardner and Sons Limited, dated 12 May 1971

To The Secretary Convener

Application for Production Bonus based on engine output

We refer to your application of 15 April for a Production Bonus based on engine output.

It is true that last year turned out to be financially a good year for the Firm, but any production bonus scheme based on this fact alone, would logically require a repayment by the workers to the Firm in a bad year.

In our opinion, the increased profits were due largely to the fact that we increased the price of Engines and Spares.

Moreover, when it was agreed in November 1970 to reduce the normal overtime worked, immediate steps were taken to cover such lost time by increasing Outside Machining, increasing the labour force, and switching of labour. Increased profits are, therefore, in spite of, rather than because of a reduction in hours worked, and the reduction in hours has simply put money which you could have earned into other peoples pockets.

If the workers have, in fact, increased their effort, as you suggest, then they will pro-rata have increased their earnings, and have been sufficiently rewarded thereby.

Having said all that, the Management are nevertheless appreciative of the fact that everyone, workers and staff, shop stewards and all grades of Management have contributed to the smooth running of the Factory and consequently they propose to pay a Production Bonus as requested based upon engine output. As we have said many time, this is not really a true criterion as it ignores (1) Spares which form a substantial portion of our output and (2) variation of engine types. Nevertheless, engine production for this particular purpose has the virtue of simplicity.

The bonus will be based on engines built over 2,760 from 5 July to 31 December 1971 (inclusive) and will be paid at the rate of 10 new pence per engine for adults and 5 new pence for young people under 20 and part-time hourly-paid employees.

The figure of 2,760 is based on 120 engines for 23 weeks and assumes that the demand for maximum output will continue over this period. There are actually 116 working days in this period - i.e. 23 weeks and 1 day.

The conditions on which such bonus will be paid are as follows:-

To all hourly-paid workers in Works and Foundries employed on 31 December 1971 - to be paid as soon as possible after 31 December.

No industrial trouble or action of any kind in the Works or Foundries (other than the official negotiating procedure.)

Payment of such bonus will be limited to this particular half year.

Payment will be subject to tax.

Payment will be computed as follows:-

The average number of engines per week over the 23 week period will be calculated and will be related to Table 1 below. Persons having less than a full 23 week entitlement will then have their bonus calculated as shown below:

Example: A man with three weeks or part week's absence (assuming an average of 125 engines for the 23 week period) would receive -

$20/23 \text{ of } £11.50 = £10.00$

When all persons having less than the maximum entitlement have been calculated, the residual sum will be equally divided amongst all hourly paid employees.

Source: L Gardner and Sons Collection, Working Class Movement Library, Salford

Appendix 5, The AMS

Description

The system consisted of 4 [German] Bohle machining centres all interlinked with a common track with self-loading systems, operated by 2 or 3 workers.

A [British] Mollart gun-drilling machine provided rapid drilling of the main bearing studs and side tie-bolt holes. It also incorporated a multi-drill head to simultaneously drill 26 holes in the chaincase end of the crankcase. This machine was a stand-alone machine, loaded from the nearby track. Completed parts were replaced on the track and were then transferred to the next operation.

The next operation, the [British built, American owned] EXLO (Ex-Cell-O) boring machine was again a stand-alone machine which rough bored the camshaft and all the chaincase end bores. Completed parts were then returned to the track and were transferred to the [British] KTM line.

The KTM line consisted of 7 machining centres, 3 of which rotated about a Z axis (Index machines), and allowed milling, drilling and tapping of 4 faces. 4 other KTM's rotated about the X axis (Trunion (Trunnion) machines), allowing milling, drilling and tapping of the top and bottom of the part.

The crankcase (crankcase) only needed to go on any 1 Index machine and 1 Trunion (Trunnion) machine, so a computerized loading management system was incorporated in this track section to manage the part loading. A storage area was built into the track to allow storage of the parts awaiting the next available machine.

The crankcases were then offloaded and sent for de-burring. This was a manual job, which was later improved with the change from traditional hand files to the use of air tools for some tasks.

A wash machine then cleaned the component free of swarf.

After this a crankshaft bearing cap was bolted on to complete the crankbore, this was performed using auto-presses and auto-stud torque track.

Finally the component was finish bored in the crankbore, cambore, and all the chaincase end bores using another EXLO boring machine.

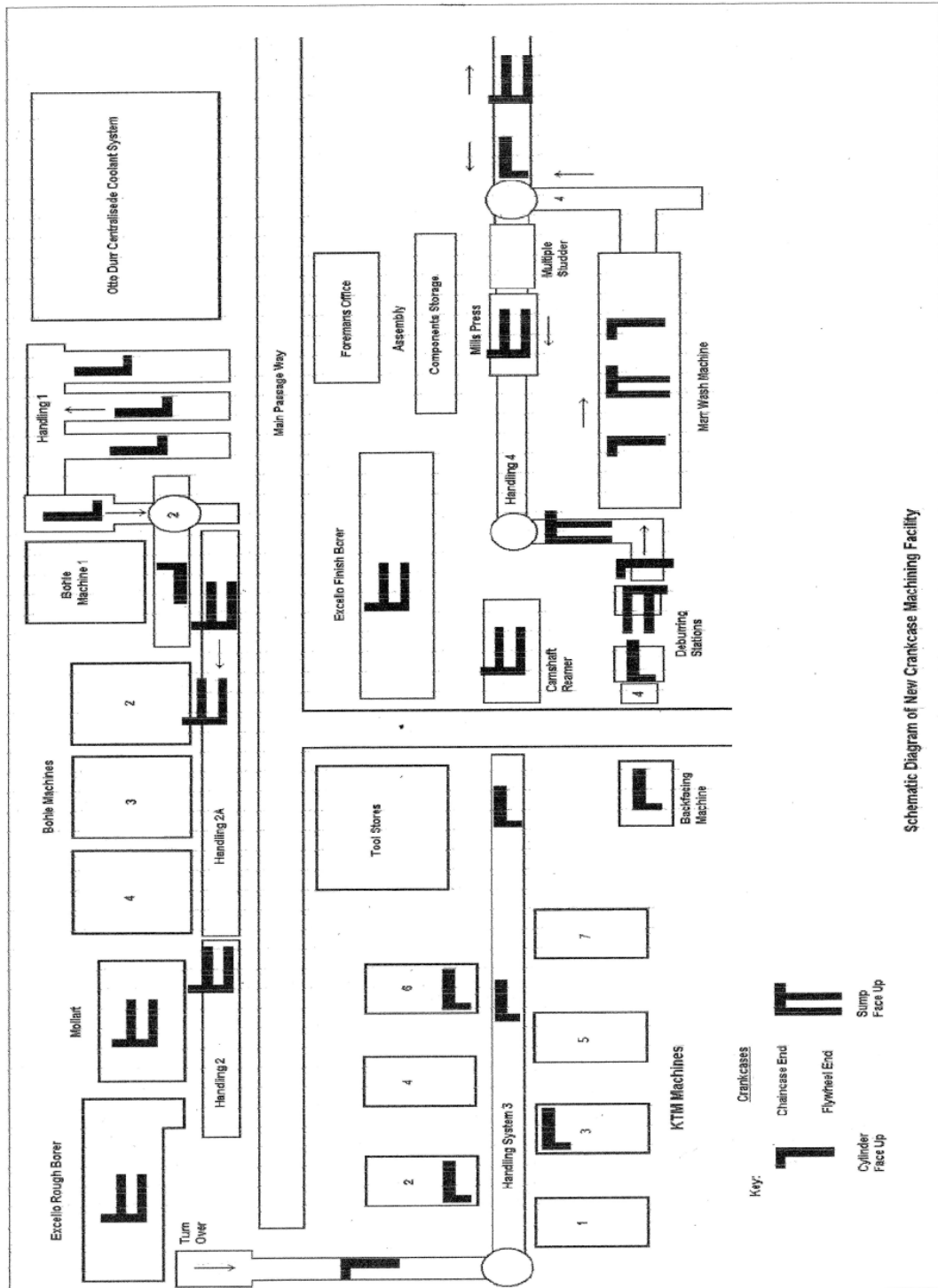
Quality checks were performed by myself at all the key stages. My main tool was a 5-foot digital height gauge which served us well although care had to be taken when setting up the workpiece to ensure accurate results. We later purchased a [Japanese] Mitutoyo CMM [computer controlled inspection machine] which allowed 3-axis checks with minimum set-up. In order to speed-up inspection a file was created for each type of crankcase, where every hole, bore, machined face was given a check number and the corresponding X - Y - Z co-ordinates were logged. In addition the thread size/bore size or any other feature was added. This allowed for logical and thorough inspection.

As the reduction in crankcases required meant that the line was vastly under used, we had to invest further in the plant to allow other major components to be machined.

Source: Peter Chadwick, Bolton to Maurice Halton, Horwich, 16 March 2004

Appendix 5, The AMS (continued)

Schematic Diagram of the New Crankcase Machining Facility (undated)



Source: The Gardner Collection, sundry documents, Working Class Movement Library, Salford.

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L. Gardner and Sons archive

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Southport Library, Local History Unit, Atkinson Library, Lord Street Southport, PR8 1DJ

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The Clifford Whitworth Library, The University of Salford, The Crescent, Salford, M5 4WT

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